

- Identify the relation between matter conserving law and the chemical reaction.
- Express chemical reactions via balanced symbolic and word equations.
- Carry out experiments to some types of chemical reactions.
- Give examples of chemical reactions from life, environment and industries.
- Highlight the mutual relation between technology and chemical reactions.
- Appreciate the benefits of experimental methods in chemical reactions and their control.
- Give examples of the positive and negative social attitudes toward chemical reactions.
- Appreciate the role of scientists in the environmental discoveries.
- Appreciate the glorious God grants and the marvelous creation in the universe.
- Appreciate the efforts of scientists in the field of chemical reactions.

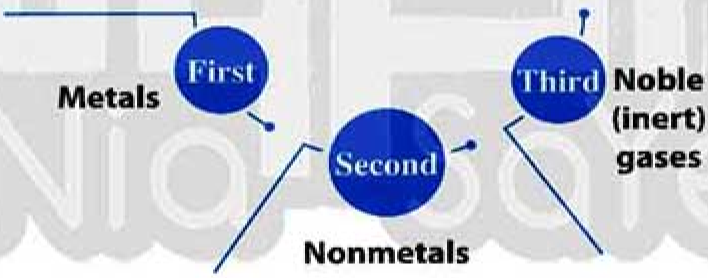
LESSON 1

Chemical Combination



What are the types of elements ?

- *The number of the well known elements up till now is **118 elements**.*
- *These elements can be classified according to their properties and electronic structure into :*



▸ **Enrichment information**

In the 19th century, Berzelius (1779 - 1848) was the first scientist who classified elements into metals and nonmetals.

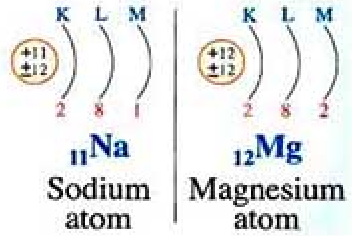
First Metals

Metals

They are the elements which contain 1, 2 or 3 electrons in the outermost energy level.

➲ Properties of metals :

1 They are the elements which contain less than 4 electrons (1 , 2 or 3 electrons) in the outermost energy level.



2 They are solids [except **mercury (Hg)** which is the only liquid metallic element].



3 They have metallic luster.



4 They are good conductors of heat and electricity.



5 They are malleable and ductile.



UNIT 1

The behaviour of atoms of metals during the chemical reaction

For illustration

➲ During the chemical reaction, atoms of metals tend to give their outermost electrons to other atoms GR. ***to complete their outermost energy level with electrons.***



➲ The atom becomes a positive ion when it loses an electron or more GR. ***because the number of positive protons becomes more than the number of negative electrons.***

A neutral sodium atom Na	A positive sodium ion (Na^+)
It contains :	**It contains :**
(**11**) electrons	(**10**) electrons
(11) protons	(11) protons

Positive ion

It is an atom of a metallic element that loses an electron or more during the chemical reaction.



In positive sodium ion (Na^+) no. of protons is more than no. of electrons

➲ The positive ion carries a number of positive charges equal to the number of the lost electron(s) from the neutral atom.

Na^+ — "+" : Represent the no. of lost electrons; "Na" : Symbol of element

Symbol of a positive sodium ion

Question **Complete :**

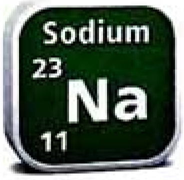
1. The number of known elements up till now is .... elements.
2. All metals are .... except .... which is a liquid.
3. Metals have less than .... electrons in their outermost shell.

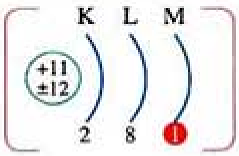
Answer

1. 118 2. solids - mercury 3. four

Examples of atoms of metals and their behaviour during the chemical reaction :

Ex. 1 During the chemical reaction, the sodium atom (Na) loses one electron and changes into a positive ion (Na^+), which carries one positive charge.

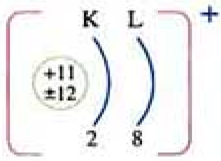




Neutral sodium atom (Na)

It contains : (11) electrons
(11) protons
(12) neutrons
(3) energy levels

Loses one electron →



Positive sodium ion (Na^+)

It contains : (10) electrons
(11) protons
(12) neutrons
(2) energy levels

Ex. 2 During the chemical reaction, the magnesium atom (Mg) loses two electrons and changes into a positive ion (Mg^{+2}), which carries two positive charges.

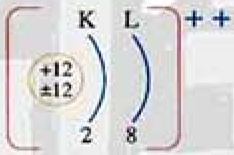




Neutral magnesium atom (Mg)

It contains : (12) electrons
(12) protons
(12) neutrons
(3) energy levels

Loses two electrons →

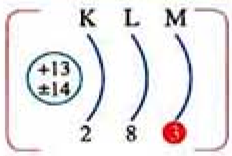


Positive magnesium ion (Mg^{+2})

It contains : (10) electrons
(12) protons
(12) neutrons
(2) energy levels

Ex. 3 During the chemical reaction, the aluminium atom (Al) loses three electrons and changes into a positive ion (Al^{+3}), which carries three positive charges.

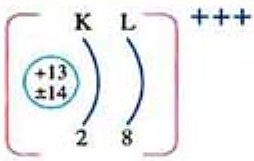




Neutral aluminium atom (Al)

It contains : (13) electrons
(13) protons
(14) neutrons
(3) energy levels

Loses three electrons →



Positive aluminium ion (Al^{+3})

It contains : (10) electrons
(13) protons
(14) neutrons
(2) energy levels

UNIT 1

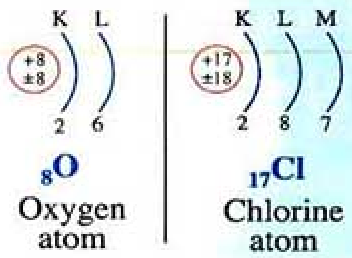
Second Nonmetals

Nonmetals

They are the elements which contain 5 , 6 or 7 electrons in the outermost energy level.

➲ Properties of nonmetals :

1 They are the elements which contain more than 4 electrons (5 , 6 or 7 electrons) in the outermost energy level.



2 They are solids and gases [except **bromine (Br)** which is the only liquid nonmetallic element].



3 They have no luster.



4 They are bad conductors of heat and electricity [except **graphite (carbon)** which is a good conductor of electricity].



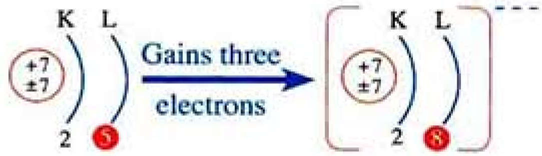
5 They are not malleable or ductile (brittle).



The behaviour of atoms of nonmetals during the chemical reaction

➲ During the chemical reaction, atoms of nonmetals tend to gain electrons from other atoms GR *to complete their outermost energy level with electrons.*

For illustration

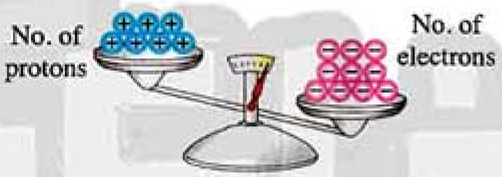


➲ The atom becomes a negative ion when it gains an electron or more GR ***because the number of electrons becomes more than the number of protons.***

A neutral nitrogen atom N	A negative nitrogen ion (N^{-3})
It contains : (7) electrons (7) protons	**It contains :** (10) electrons (7) protons

Negative ion

It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.



In negative nitrogen ion (N^{-3}) no. of electrons is more than no. of protons

➲ The negative ion carries a number of negative charges equal to the number of gained electron(s).

N^{-3}

- -3 : Represents the no. of gained electrons
- N : Symbol of element

Symbol of a negative nitrogen ion

What happens when ? You hammer on a piece of carbon and why ?

➲ It will be fragmented easily, because carbon is from nonmetals which are not malleable.

NB

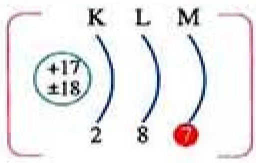
A hydrogen ($_1H$) atom and a carbon ($_6C$) atom are considered from nonmetals although the outermost energy level of a hydrogen atom contains 1 electron and that of a carbon atom contains 4 electrons.

UNIT 1

Examples of atoms of nonmetals and their behaviour during the chemical reaction :

Ex. 1 During the chemical reaction, the chlorine atom (Cl) gains one electron and changes into a negative ion (Cl^-), which carries one negative charge.

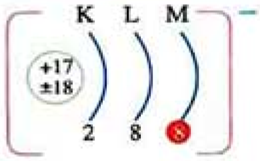
Chlorine $^{35}_{17}Cl$



Neutral chlorine atom (Cl)

It contains : (17) electrons
(17) protons
(18) neutrons
(3) energy levels

Gains one electron →

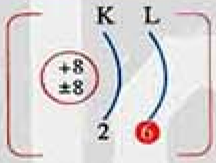


Negative chlorine ion (Cl^-)

It contains : (18) electrons
(17) protons
(18) neutrons
(3) energy levels

Ex. 2 During the chemical reaction, the oxygen atom (O) gains two electrons and changes into a negative ion (O^{-2}), which carries two negative charges.

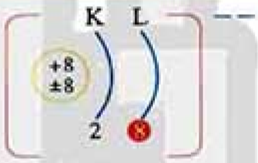
Oxygen $^{16}_{8}O$



Neutral oxygen atom (O)

It contains : (8) electrons
(8) protons
(8) neutrons
(2) energy levels

Gains two electrons →

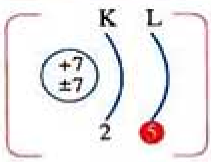


Negative oxygen ion (O^{-2})

It contains : (10) electrons
(8) protons
(8) neutrons
(2) energy levels

Ex. 3 During the chemical reaction, the nitrogen atom (N) gains three electrons and changes into a negative ion (N^{-3}), which carries three negative charges.

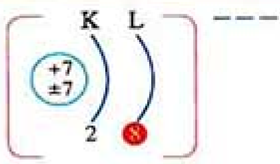
Nitrogen $^{14}_{7}N$



Neutral nitrogen atom (N)

It contains : (7) electrons
(7) protons
(7) neutrons
(2) energy levels

Gains three electrons →



Negative nitrogen ion (N^{-3})

It contains : (10) electrons
(7) protons
(7) neutrons
(2) energy levels

GR.

Both a sodium ion and an oxygen ion have the same number of electrons.

Because a sodium ion is formed when a sodium atom loses one electron and changes into (Na^+) which contains 10 electrons, while an oxygen ion is formed when an oxygen atom gains two electrons and changes into (O^{-2}) which contains 10 electrons too.

➲ **From the previous explanation, we can define the ion as follows :**

The ion

It is the atom of an element that loses or gains an electron or more during the chemical reaction.

NB

When an atom changes into an ion, the mass number remains as the same without change, while the number of electrons changes.

▸ Enrichment information

- A positive ion diameter is smaller than its atomic diameter.
- A negative ion diameter is bigger than its atomic diameter.

Explanation

- When an atom loses an electron or more, its diameter decreases, and consequently its volume decreases due to lack of electrons rather than protons, and the attraction of nucleus to the remaining electrons increases.
- By gaining an electron or more, an atom diameter increases and its volume increases due to the increase in the number of electrons rather than protons and the occurrence of repelling.





➲ **Comparison between the atom and the ion :**

The atom	The ion
1. It is electrically neutral in its ordinary state. 2. The number of electrons equals the number of protons. 3. Its outermost energy level is not completely filled with electrons except atoms of noble gases.	1. It is positive or negative electric charge. 2. The number of electrons is more or less than the number of protons. 3. Its outermost energy level is completely filled with electrons.

UNIT 1

➲ **Comparison between metals and nonmetals :**

P.O.C	Metals	Nonmetals
1. Physical state :	They are solids [except mercury (Hg) which is a liquid].	They are solids and gases [except bromine (Br) which is a liquid].
2. Metallic luster :	They have metallic luster.	They have no luster.
3. Malleable & ductile :	They are malleable and ductile.	They are not malleable or ductile.
4. Heat & electric conduction :	They are good conductors of heat and electricity.	They are bad conductors of heat and electricity [except graphite which is a good conductor of electricity].
5. No. of electrons in outer shell :	They have less than (4) electrons in the outermost energy level.	They have more than (4) electrons in the outermost energy level.
6. Behaviour of atoms during the chemical reaction :	During the chemical reaction, their atoms tend to lose an electron or more and change into positive ions.	During the chemical reaction, their atoms tend to gain an electron or more and change into negative ions.

➲ **Comparison between a positive ion and a negative ion :**

Positive ion	Negative ion
1. It is an atom of a metallic element that loses an electron or more during the chemical reaction.	1. It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.
2. It carries a number of positive charges equals to the number of the lost electrons.	2. It carries a number of negative charges equals to the number of the gained electrons.
3. The number of its electrons is less than the number of protons.	3. The number of its electrons is more than the number of protons.
4. The number of its energy levels is less than that of its atom.	4. The number of its energy levels is equal to that of its atom.

Third Noble (inert) gases

They are elements in which the outermost electron shells are completely filled with 8 electrons (except helium which has 2 electrons in its outermost electron shell).

Therefore :
- They don't participate in any chemical reaction in ordinary conditions.
- Their molecules consist of one single atom (monoatomic).
- They don't form positive or negative ions in the ordinary conditions.

So, we can define noble gases as follows :

Noble (inert) gases

They are elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.

GR.

Noble gases don't participate in chemical reactions under the ordinary conditions.

Due to the completeness of their outermost energy levels with electrons.

➲ The following table shows the atomic structure and the electronic configuration of some atoms of noble gases :

The atom of the inert gas	Electronic configuration	No. of electrons in the outermost shell
Helium $^{4}_{2}He$	(+2, ±2) K: 2	2
Neon $^{20}_{10}Ne$	(+10, ±10) K: 2, L: 8	8
Argon $^{40}_{18}Ar$	(+18, ±22) K: 2, L: 8, M: 8	8

UNIT 1

Exercise 1

Which of the following figures represents (Give a reason for your answer) :

1. An atom of a metallic element.
2. An atom of a nonmetallic element.
3. A noble gas.
4. A positive ion.
5. A negative ion.

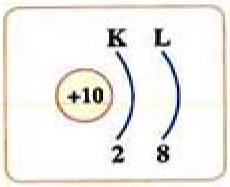


Fig. (A)

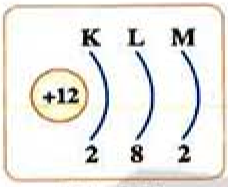


Fig. (B)

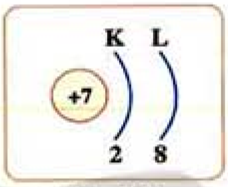


Fig. (C)

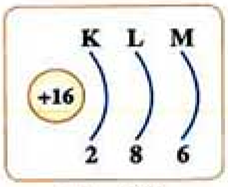


Fig. (D)

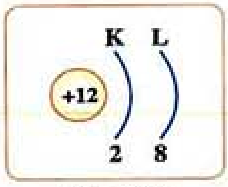


Fig. (E)

Answer

1. Fig. (B), because it contains 2 electrons in the outermost energy level and the no. of protons equals to the no. of electrons.
2. Fig. (D), because it contains 6 electrons in the outermost energy level and the no. of protons equals to the no. of electrons.
3. Fig. (A), due to the completeness of its outermost energy level with 8 electrons and the no. of protons equals to the no. of electrons.
4. Fig. (E), because the no. of protons is more than the no. of electrons.
5. Fig. (C), because the no. of protons is less than the no. of electrons.

Exercise 2 **Complete the following table : (Answer by yourself).**

Element	Its electronic configuration			Its type	Type of ion	Electronic configuration of the ion		
	K	L	M			K	L	M
$_{7}N$	.....	.....	.....	....	....	.....	.....	.....
$_{11}Na$	.....	.....	.....	....	....	.....	.....	.....
$_{13}Al$	.....	.....	.....	....	....	.....	.....	.....
$_{8}O$	.....	.....	.....	....	....	.....	.....	.....
$_{17}Cl$	.....	.....	.....	....	....	.....	.....	.....
$_{18}Ar$	.....	.....	.....	....	....	.....	.....	.....

TRY TO ANSWER worksheet 1 in the Notebook

Chemical bonds

- Atoms combine with each other forming molecules through "Chemical bonds".

We will study two types of bonds, which are :

- **First:** Ionic bond
- **Second:** Covalent bond

First Ionic bond

It is a type of chemical bonds that is formed as a result of combination between a positive ion for an atom of a metallic element and a negative ion for an atom of a nonmetallic element to form a molecule of an ionic compound.

HOW is an ionic bond formed ?

Combination between

Metal element with **Nonmetal element**

Metal element	Nonmetal element
A metal atom loses the outermost electron(s) and changes into a positive ion.	A nonmetal atom gains the electron(s) lost from a metal atom and changes into a negative ion.
$M \longrightarrow M^+ + e^-$	$X + e^- \longrightarrow X^-$

A strong electrical (electrostatic) attraction between positive and negative ions occurs due to their difference in electric charge resulting in the ionic bond.

$$M^+ + X^- \longrightarrow M^+X^-$$

Positive ion + Negative ion → A molecule of an ionic compound

So, the ionic bond is defined as :

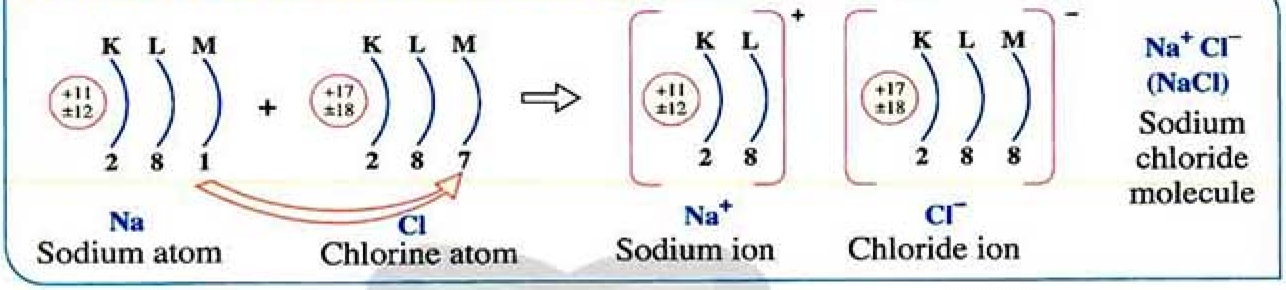
Ionic bond

It is a chemical bond resulting from the electric attraction between a positive ion and a negative ion.

Examples :

Ex. 1 Formation of a sodium chloride (table salt) molecule [NaCl] :

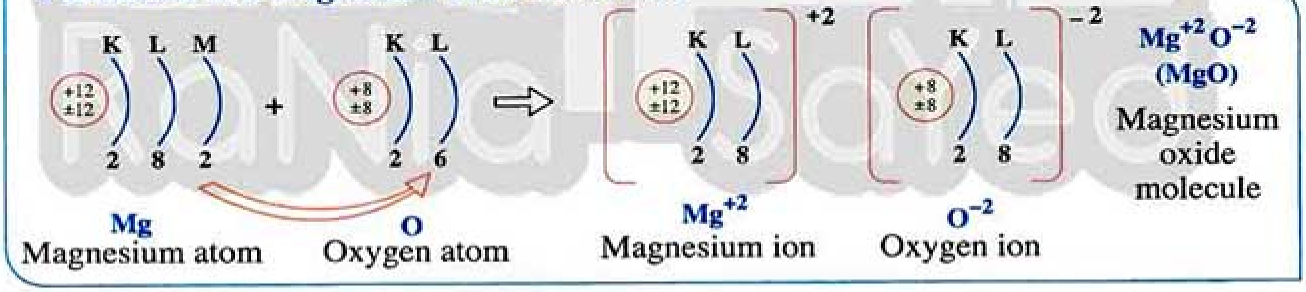
Formation of a sodium chloride molecule :



- A sodium (metal) atom ($^{23}_{11}Na$) loses one electron and changes into a positive ion (Na^+).
- A chlorine (nonmetal) atom ($^{35}_{17}Cl$) gains this electron (which is lost by a sodium atom) and changes into a negative ion (Cl^-).
- A strong ionic bond is formed due to the electric attraction between a positive sodium ion (Na^+) and a negative chloride ion (Cl^-) forming an ionic molecule of sodium chloride (NaCl).

Ex. 2 Formation of a magnesium oxide molecule [MgO] :

Formation of a magnesium oxide molecule :



- A magnesium (metal) atom ($^{24}_{12}Mg$) loses 2 electrons and changes into a positive ion (Mg^{+2}).
- An oxygen (nonmetal) atom ($^{16}_{8}O$) gains 2 electrons (which are lost by magnesium atom) and changes into a negative ion (O^{-2}).
- A strong ionic bond is formed due to the electric attraction between a positive magnesium ion (Mg^{+2}) and a negative oxygen ion (O^{-2}) forming an ionic molecule of magnesium oxide (MgO).

GR.

- ***Ionic bond produces compounds molecules only and don't produce elements molecules.***
  Because ionic bond arises between two different atoms as a result of the electric attraction between a positive ion for an atom of a metallic element and a negative ion for an atom of a nonmetallic element.
- ***It is impossible to combine sodium and magnesium together to form a compound.***
  Because each of them is a metal and its atom tends to lose the outermost electrons during chemical reactions.

➲ **From the previous explanation, we conclude that :**

The ionic bond can't be originated between :
- Two atoms of a metal element (similar atoms) **because** each of them form a positive ion.
- Two atoms of a nonmetal element (similar atoms) **because** each of them form a negative ion.

Second Covalent bond

It is a type of chemical bonds that occurs between two nonmetal atoms to form molecules of covalent compounds.

HOW is a covalent bond formed ?

- When two nonmetal atoms are interacting with each other, no one of them loses or even gains any electrons.

But, each atom **shares** the other with a number of electrons (from its outermost shell) **equal to** the number of electrons it needs to complete its outermost shell.

- An interference occurred between both atoms, resulting in bond known as a covalent bond.

So, the covalent bond is defined as :

Covalent bond

It is a chemical bond originated between the atoms of nonmetals through sharing (participation) of each atom with a number of electrons to complete the outer electron shell of each atom.

NB

1. Covalent bond originated between two atoms for a nonmetallic element producing elements molecules.
2. Covalent bond originated between two atoms for two nonmetallic elements producing compounds molecules.

UNIT 1

Types of covalent bonds

1. Single covalent bond
2. Double covalent bond
3. Triple covalent bond

1 Single covalent bond

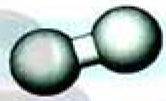
Single covalent bond

It is a chemical bond which arises between two nonmetal atoms, where each atom shares the other atom with one electron.

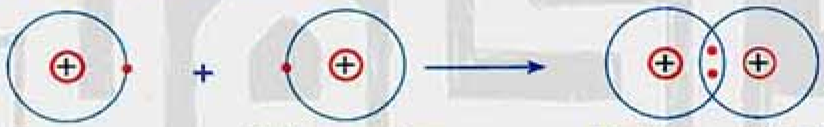
- It is represented by one line (–) joining the two atoms.

Examples :

Ex. 1 Single covalent bond between two atoms for one element.



Formation of a hydrogen molecule (H_2) :



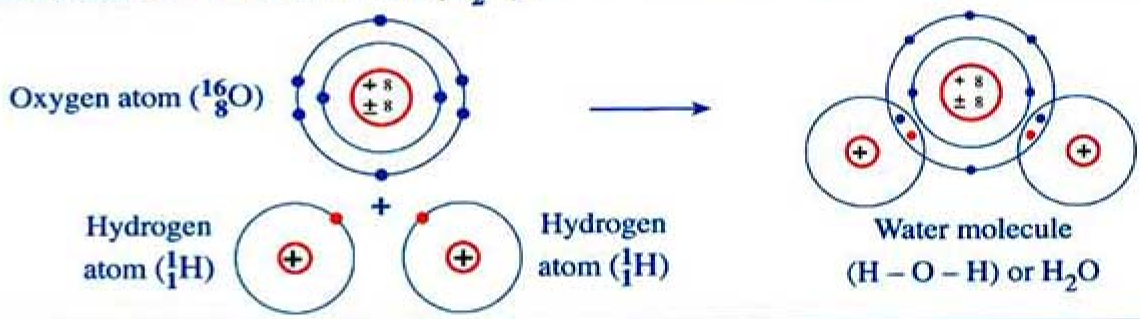
Hydrogen atom (^1_1H) + Hydrogen atom (^1_1H) → Hydrogen molecule (H – H) or (H_2)

➲ Each hydrogen atom shares with one electron to complete its outermost shell with two electrons and becomes more stable.

Ex. 2 Single covalent bond between one atom for one element and two atoms for another element.



Formation of a water molecule (H_2O) :



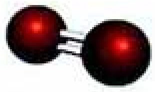
➲ An oxygen atom shares with two electrons, while each hydrogen atom shares with one electron to complete their outermost shell.

2 Double covalent bond

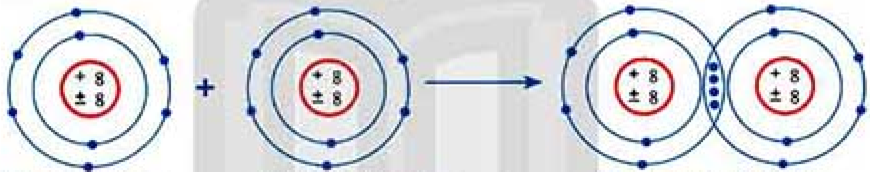
Double covalent bond

It is a chemical bond which arises between two nonmetal atoms, where each atom shares the other atom with two electrons.

- It is represented by two lines (=) joining the two atoms.



Ex. 1 Formation of an oxygen molecule (O_2) :



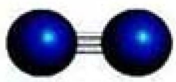
➲ Each oxygen atom shares with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

3 Triple covalent bond

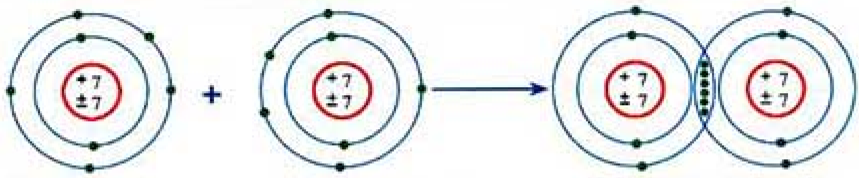
Triple covalent bond

It is a chemical bond which arises between two nonmetal atoms, where each atom shares the other atom with three electrons.

- It is represented by three lines (≡) joining the two atoms.



Ex. 1 Formation of a nitrogen molecule (N_2) :



➲ Each nitrogen atom shares with three electrons to complete its outermost shell with 8 electrons and becomes more stable.

UNIT 1

GR.

- ***The covalent bond produces elements molecules.***
  Because it arises between two atoms for a nonmetallic element.
- ***The covalent bond produces compounds molecules.***
  Because it arises between two atoms for two nonmetallic elements.
- ***When an atom of chlorine ($_{17}Cl$) is combined with an atom of sodium ($_{11}Na$), the product will be an ionic compound, but when two atoms of chlorine are combined together, the product will be a covalent molecule.***
  Because chlorine atom (nonmetal) gains the electron, which is lost by sodium atom (metal), so an electric attraction occurs between positive sodium ion and negative chloride ion, while each of the two chlorine atoms shares with one electron to complete its outermost shell.

Enrichment information

- A covalent bond may occur among various atoms of nonmetal elements such as a covalent bond in hydrogen chloride HCl [H–Cl].
- The Egyptian scientist Ahmed Zweil has been granted the Nobel prize in chemistry 1999 in favour of his appreciated role in inventing new brands of cameras working via laser technologies.

Comparison between an ionic bond and a covalent bond :

Ionic bond	Covalent bond
1. It arises between metal and nonmetal elements.	1. It arises between two nonmetal elements.
2. It is formed by losing and gaining of electrons.	2. It is formed by sharing of one pair of electrons or more.
3. It is formed between two atoms of two different elements.	3. It may be formed between two atoms of the same or different elements.
4. It is formed due to the electrical attraction between the positive and negative ions.	4. It is formed due to sharing of electrons between the atoms.
5. It has one type.	5. It has three types (single, double and triple).
6. It produces compounds molecules only.	6. It produces elements and compounds molecules.

TRY TO ANSWER worksheet 2 in the Notebook

Remember



- The number of the well known elements up till now is **118 elements.**
- **Elements can be classified according to their properties and electronic structure into :**

  Metals : They are the elements which have less than four electrons in the outermost shell and have luster, they are good conductors of heat and electricity, malleable and ductile.

  Nonmetals : They are the elements which have more than four electrons in the outermost shell and have no luster, they are bad conductors of heat and electricity (except graphite), not malleable or ductile.

  Nobel (inert) gases : They are the elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.

- **Ion :** It is the atom of an element which loses or gains an electron or more during the chemical reaction.
- **Positive ion :** It is an atom of a metallic element that loses an electron or more during the chemical reaction.
- **Negative ion :** It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.

Chemical bonds

Ionic bond

It is a chemical bond resulting from the electric attraction between a positive ion and a negative ion. [Ex.: NaCl & MgO]

Covalent bond

It is a chemical bond originated between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.

Types of covalent bonds

Single covalent bond (-)

It is a chemical bond which arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares with one electron. [Ex.: H_2 & H_2O]

Double covalent bond (=)

It is a chemical bond which arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares with two electrons. [Ex.: O_2]

Triple covalent bond (≡)

It is a chemical bond which arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares with three electrons. [Ex.: N_2]

Questions
on lesson one

Questions signed by 🕮 have been taken from the school book.

1. Choose the correct answer :

1. The number of known elements up till now is .... elements.
   a. 92 b. 118 c. 121 d. 211

2. All of these elements are metal solid elements except ....
   a. sodium. b. magnesium. c. mercury. d. aluminium.

3. All of the following are properties of metals except ....
   a. they are malleable and ductile.
   b. they are good conductors of electricity.
   c. they contain 1, 2 or 3 electrons in outermost shell.
   d. they are bad conductors of heat.

4. All of the following are metals except ....
   a. iron. b. oxygen. c. copper. d. sodium.

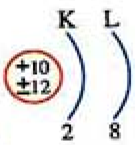
5. Oxygen is from ....
   a. acids. b. bases. c. metal elements. d. nonmetal elements.

6. The element which has atomic number 12 is considered from ....
   a. metals. b. nonmetals. c. noble gases. d. no correct answer.

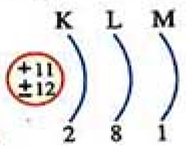
7. When an atom of an element loses one electron or more, it changes into ....
   a. a negative ion. b. a positive ion. c. a neutral atom. d. no correct answer.

8. All of the following elements can form positive ions except ....
   a. sodium ($_{11}Na$). b. chlorine ($_{17}Cl$).
   c. magnesium ($_{12}Mg$). d. aluminium ($_{13}Al$).

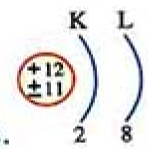
9. Which of the following figures represents the structure of sodium ion ? Fig. (............).



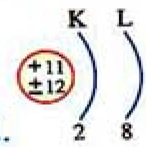
a.



b.



c.



d.

10. The number of energy levels in sodium ion is .... the number of energy levels in its atom.
    a. less than b. more than c. equal to d. no correct answer

11. When an atom is changed into an ion, the .... is changed.
 a. number of protons b. number of neutrons
 c. number of electrons d. mass number

12. A lithium atom (Li) changes into a lithium ion (Li^+), which mean that it ....
 a. gains one proton. b. gains one electron.
 c. loses one proton. d. loses one electron.

13. During the chemical reaction, a magnesium atom ($_{12}Mg$) loses its outer electrons and changes into ....
 a. Mg^+ b. Mg^- c. Mg^{+2} d. Mg^{-2}

14. The only nonmetal that exists in a liquid state is ....
 a. bromine. b. chlorine. c. hydrogen. d. nitrogen.

15. All of nonmetals don't conduct electricity except ....
 a. bromine. b. aluminium. c. graphite. d. mercury.

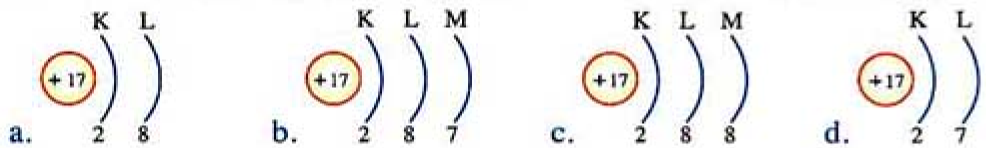
16. In a negative ion, the number of protons is .... the number of electrons.
 a. less than b. more than c. equal to d. no correct answer

17. All of these elements can form negative ions except ....
 a. oxygen ($_8O$). b. nitrogen ($_7N$). c. chlorine ($_{17}Cl$). d. aluminium ($_{13}Al$).

18. When a nitrogen atom ($^{14}_{7}N$) gains electrons to complete its outer shell, it becomes ....
 a. N^{+3} b. N^{-2} c. N^{-3} d. N^-

19. The number of electrons in oxygen ion (O^{-2}) is .... electrons.
 a. 6 b. 8 c. 10 d. 12

20. Which of the following figures represents the chloride ion (Cl^-) ? Fig. (............).



21. The number of .... determines the type of element and its chemical activity.
 a. electrons in the outermost energy level b. levels filled with electrons
 c. neutrons d. protons

22. All the following are properties of inert gases except ....
 a. they don't participate in chemical reactions.
 b. their outermost electron shells are completely filled.
 c. they form negative ions.
 d. their molecules consist of one single atom.

23. All of these elements can participate in chemical reactions except ....
a. sodium ($_{11}Na$). b. neon ($_{10}Ne$). c. hydrogen ($_{1}H$). d. nitrogen ($_{7}N$).

24. The molecule of a noble gas consists of ....
a. two different atoms. b. one atom.
c. two similar atoms. d. one or two similar atoms.

25. During the formation of a sodium chloride molecule, sodium atom ....
a. gains one electron from chlorine atom.
b. gives one electron to chlorine atom.
c. gains two electrons from chlorine atom.
d. gives two electrons to chlorine atom.

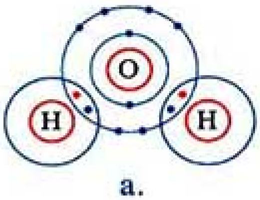
26. During the formation of a magnesium oxide molecule, oxygen atom changes into ....
a. positive ion and carries one positive charge.
b. negative ion and carries one negative charge.
c. positive ion and carries two positive charges.
d. negative ion and carries two negative charges.

27. The bond in a sodium chloride molecule is .... bond.
a. single covalent b. double covalent c. triple covalent d. ionic

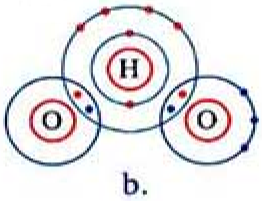
28. The covalent bond usually arises between .... elements.
a. two metallic b. two nonmetallic
c. metallic and nonmetallic d. metallic and noble

29. All of the following are examples of single covalent bonds except ....
a. H_2 b. HCl c. N_2 d. H_2O

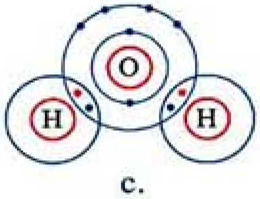
30. Which of the following figures represents the molecule of water ? Fig.(............).



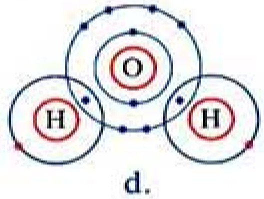
a.



b.



c.



d.

31. All of the following are covalent molecules except ....
a. H_2O b. MgO c. HCl d. O_2

32. The covalent bond in an oxygen molecule is a .... bond.
a. single b. double c. triple d. no correct answer

33. There is a triple covalent bond in .... molecule.
a. hydrogen b. chlorine c. oxygen d. nitrogen

2. Put (✓) in front of the right statement and (✗) in front of the wrong one and correct it :

1. All metals are solids except mercury which is a liquid. ( )
2. Metals tend to lose electrons and convert into negative ions. ( )
3. Sodium, magnesium and aluminium can form positive ions. ( )
4. In a positive ion, the number of electrons is greater than the number of protons. ( )
5. Nonmetals have more than four electrons in their outer shells. ( )
6. Metals are malleable and ductile, while nonmetals are not. ( )
7. The outermost energy level of sodium ion (Na^+) has one electron. ( )
8. Carbon is the only nonmetal that conducts electricity. ( )
9. The molecules of noble gases are diatomic molecules. ( )
10. Ionic bond arises between two nonmetals. ( )
11. The bond in sodium chloride is a single covalent bond. ( )
12. During the formation of a magnesium oxide molecule, a magnesium atom gains two electrons from oxygen atom. ( )
13. Magnesium oxide is an ionic compound. ( )
14. In an ionic bond, the metal atom gives electrons to the nonmetal atom. ( )
15. The bond in a hydrogen molecule is a double covalent bond. ( )
16. Each atom in an oxygen molecule shares by two electrons. ( )
17. The bond in a nitrogen molecule is a triple covalent bond. ( )
18. In a covalent bond, the two nonmetal atoms do not lose or gain electrons. ( )
19. The bond in water molecule is an ionic bond. ( )

3. Write the scientific term of each of the following :

1. 📖 Elements have luster, good conductors of heat and electricity, malleable and ductile and they contain 1, 2 or 3 electrons in their outer electron shells.
2. The only metal that exists in a liquid state.
3. 📖 Elements that may be solids, liquids or gases and having no luster, bad conductors of heat and electricity , not malleable or ductile and containing 5, 6 or 7 electrons in their outer electron shells.
4. The only nonmetal that exists in a liquid state.
5. The only nonmetal that conducts electricity.
6. 📖 An atom gave (lost) an electron or more during the chemical reaction.
7. 📖 An atom gained one electron or more during the chemical reaction.
8. An atom that gives or gains an electron or more during the chemical reaction.
9. 📖 An atom of an element that neither loses nor gains any electrons.

10. Elements whose outermost shells are completely filled with electrons.
11. 📖 A bond resulting from the electric attraction between a positive ion and a negative ion.
12. • The bond that is formed between magnesium and oxygen atoms.
    • The chemical bond originated between two elements have atomic numbers 11 and 17.
13. A bond that is formed between two nonmetals with sharing of electrons.
14. A bond arises between two hydrogen atoms, where each atom shares with one electron.
15. A bond that is resulted from the sharing of each atom with two electrons.
16. • A bond that is formed between two nonmetals through sharing of each atom by three electrons.
    • 📖 A bond resulting from the participation of each of the two atoms with three electrons.

4. Complete the following statements :

1. The number of known elements up till now is .... elements.
2. Elements are classified according to their properties and electronic structure into ...., ... and ....
3. Metals have less than .... electrons in their outermost shell.
4. All metals are .... except .... which is a liquid.
5. .... elements are good conductors of heat and electricity.
6. Atoms of .... tend to lose an electron or more during the chemical reaction and change into .... ion.
7. .... and .... atoms are examples of metal atoms.
8. During the chemical reaction, a sodium atom ($^{23}_{11}Na$) .... one electron and changes into .... ion.
9. The number of electrons in the outermost shell of a magnesium ($^{24}_{12}Mg$) atom is .... , while that of a magnesium ion is ....
10. Nonmetals have .... than 4 electrons in their outermost shell.
11. Some nonmetals are gases as .... and others are solids as ....
12. All nonmetals are .... conductors of electricity except .... which is .... conductor of electricity.
13. Elements of .... have luster, while elements of .... do not have luster.
14. Elements of .... are malleable and ductile, while elements of .... are not malleable or ductile.
15. .... is the only liquid metallic element, while .... is the only liquid nonmetallic element.
16. A nitrogen atom contains .... electrons, while a nitrogen ion contains .... electrons.
17. The symbol of an oxygen ion is ...., while that of a sodium ion is ....

18. The number of energy levels in an atom of .... element is equal to the number of energy levels in its ion, while the number of energy levels in an atom of .... element is more than the number of energy levels in its ion.
19. An atom of .... doesn't lose or gain any electrons under ordinary conditions.
20. .... elements do not participate in chemical reactions in ordinary conditions as the outer shell is filled with ....
21. An ionic bond arises between .... and .... elements.
22. An ionic bond resulted from the electric attraction between .... and ....
23. During the formation of sodium chloride, ($_{17}Cl$) atom .... one electron and changes into .... ion.
24. During the formation of MgO molecule, ... atom loses .... electrons which are gained by .... atom.
25. .... and .... are examples of ionic compounds.
26. Covalent bonds are formed between two .... elements.
27. In .... bond, the atoms don't lose or gain any electrons.
28. The chemical bond in a magnesium oxide molecule is .... bond, while the bond in oxygen molecule is .... bond.
29. The bond in sodium chloride molecule is .... bond, whereas the bonds in water molecule are .... bonds.
30. An oxygen atom .... two electrons during the formation of a magnesium oxide molecule, while it .... two electrons during the formation of an oxygen molecule.
31. The types of covalent bonds are .... , ... and ....
32. The bond in a hydrogen molecule is a .... bond, while the bond in a nitrogen molecule is a .... bond.

5. Complete the following tables :

A

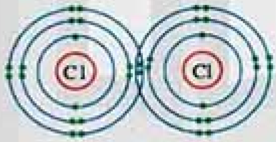
Element	Electronic configuration				No. of protons	Its type	No. of electrons in ion	Type of ion	Symbol of its ion
	K	L	M	N					
1. $_{12}Mg$	.....	.....	.....	.....	....	....	....	....	....
2. $_{15}P$	.....	.....	.....	.....	....	....	....	....	....
3. $_{18}Ar$	.....	.....	.....	.....	....	....	....	....	....
4. $_{17}Cl$	.....	.....	.....	.....	....	....	....	....	....
5. $_{19}K$	.....	.....	.....	.....	....	....	....	....	....

B

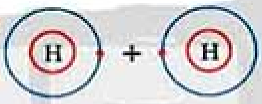
Atom	Electronic configuration			Molecule	Type of bond
	K	L	M		
1. $_{11}Na$	.....	.....	.....	NaCl	....
$_{17}Cl$	.....	.....	.....		
2. $_{12}Mg$	.....	.....	.....	MgO	....
$_{8}O$	.....	.....	.....		
3. $_{7}N$	.....	.....	.....	N_2	....
4. $_{8}O$	.....	.....	.....	O_2	....

6. Complete the following figures and write the kind of the bond :

1. .... + ... →

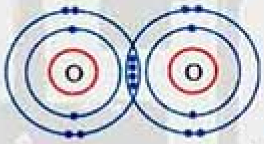


Chlorine molecule (Cl_2)

2. 

→ ....

3. .... + ... →



Oxygen molecule (O_2)

4. 

→ ....

7. Give reasons for :

1. The number of electrons of an ion differs from that of its atom.
2. The electric wires are manufactured of copper (or aluminium).
3. When an atom loses an electron or more, it becomes a positive ion.
4. When an atom gains an electron or more, it becomes a negative ion.
5. The number of energy levels in the ion of a metallic element is less than the number of energy levels in its atom.
6. A sodium atom ($_{11}Na$) tends to form a positive ion, while oxygen atom ($_{8}O$) tends to form a negative ion.
7. Noble gases don't participate in chemical reactions under the ordinary conditions.
8. Both sodium ion and oxygen ion have the same number of electrons.

9. The bond in a molecule of magnesium oxide (MgO) is an ionic bond [regarding that the atomic number for magnesium (Mg) = 12 and oxygen (O) = 8].
10. It is impossible to combine sodium and magnesium together to form a compound.
11. Ionic bonds produce compounds only not elements, but the covalent bonds may produce both types an element or even a compound.
12. When an atom of chlorine ($_{17}Cl$) is joined with an atom of sodium ($_{11}Na$), the product will be an ionic compound, but when two atoms of chlorine are joined together, the product will be a covalent molecule.
13. The bond in a hydrogen (H_2) molecule is a single covalent bond.
14. The bond in an oxygen (O_2) molecule is a double covalent bond.
15. The bond in a water (H_2O) molecule is a single covalent bond.
16. The bond in a nitrogen ($_7N$) molecule is a triple covalent bond.

8. What is meant by ... ?

1. Metals.
2. Nonmetals.
3. Positive ion.
4. Negative ion.
5. The ion.
6. Noble (inert) gases.
7. Ionic bond.
8. Covalent bond.
9. Single covalent bond.
10. Double covalent bond.
11. Triple covalent bond.

9. What happens when ... ?

1. You hammer on a piece of carbon and why ?
2. An atom loses one electron or more.
3. An atom gains one electron or more.
4. An oxygen atom combines with a magnesium atom.
5. A chlorine atom combines with a hydrogen atom.
6. Two oxygen atoms combine together.

10. Choose the odd word (or symbol) out, then mention the scientific name of the rest :

1. Magnesium / Sodium / Mercury / Aluminium.
2. $_{17}Cl$ / $_{20}Ca$ / $_{19}K$ / $_{11}Na$
3. $_{12}Mg$ / $_{11}Na$ / $_{4}Be$ / $_{20}Ca$
4. Hydrogen / Oxygen / Nitrogen / Graphite.
5. Oxygen / Nitrogen / Chlorine / Sodium.
6. $_{9}F$ / $_{16}S$ / $_{5}B$ / $_{15}P$
7. $_{2}He$ / $_{18}Ar$ / $_{11}Na$ / $_{10}Ne$
8. Nitrogen molecule / Table salt molecule / Hydrogen molecule / Oxygen molecule.

UNIT 1

11. **Write down the electronic configuration of the atoms of the following elements :**

($_{18}Ar$ – $_{12}Mg$ – $_{16}S$).

Then indicate :

1. The type of each atom (metal - nonmetal - noble).
2. The type of each ion (positive - negative - has no ions).

12. **Write the electronic configuration of each of the following atoms :**

($_{1}H$ – $_{11}Na$ – $_{7}N$ – $_{10}Ne$ – $_{8}O$ – $_{17}Cl$ – $_{19}K$).

Then indicate :

1. The type of each element (metal - nonmetal - nobel gas).
2. The type of ion for each of them (positive - negative - no ions).
3. How the bond is formed between :
   a) Two hydrogen atoms. b) Two nitrogen atoms.
4. The element that has no ability to form a bond is ....

13. **Compare between :**

1. An atom and an ion.
2. Metals and nonmetals.
3. Mercury and bromine [According to : Type of element - Physical state - Luster].
4. Aluminium and graphite [According to : Electric conduction - Heat conduction - Ability to malleable and ductile].
5. Positive ion and negative ion.
6. Ionic bond and covalent bond.
7. Single, double and triple covalent bonds.

14. **Mention one difference between :**

1. Graphite and oxygen.
2. (Na) and (Na^+).
3. (O_2) and (2O).

15. **Mention the properties of :**

1. Metals.
2. Nonmetals.

16. **You see one of the iron smiths hitting a rod of iron without being broken, but if somebody hits a piece of coal, it will be easily broken into pieces. How do you explain ?**

17. Draw a diagram showing the electronic configuration of the atom of oxygen ($^{16}_{8}O$), then show how two of its atoms are bonded to form oxygen molecule (O_2).

18. Show by drawing the combination between each of the following and mention the type of bond.

1. Hydrogen ($_1H$) and oxygen ($_8O$) to form water molecule.
2. Magnesium ($_{12}Mg$) and oxygen ($_8O$) to form magnesium oxide molecule.
3. Oxygen ($_8O$) and calcium ($_{20}Ca$) to form calcium oxide molecule.
4. Sodium atom ($_{11}Na$) and chlorine atom ($_{17}Cl$) to form sodium chloride molecule.
5. Two hydrogen atoms ($_1H$) to form hydrogen molecule.
6. Two nitrogen atoms ($_7N$) to form nitrogen molecule.

19. The following figures represent some atoms. Answer the following questions :

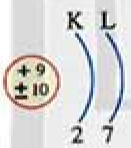


Fig. (a)

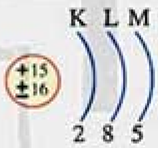


Fig. (b)

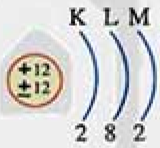


Fig. (c)

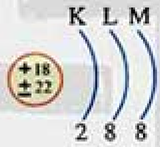


Fig. (d)

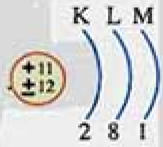


Fig. (e)

1. Find the type of element and ion if it is present.
2. Find the no. of electrons which lost or gained during the chemical reactions.
3. Which of these atoms is a good conductor of heat and electricity.

20. The following figures represent three molecules, whose atoms combine together by covalent bonds.


Fig. (a)


Fig. (b)


Fig. (c)

- Which of these figures represents :

1. Hydrogen molecule.
2. Oxygen molecule.
3. Nitrogen molecule.

21. Two elements (X and Y) have atomic numbers (11 and 17) respectively :

1. Show by drawing how the chemical bond is formed between them.
2. What is the type of this bond ?

22. Two elements ($_8A$) & ($_{12}B$) :

1. Which one is a metal and which one is nonmetal ?
2. What is the kind of bond formed between the two atoms of (A) ? Show by drawing.
3. Show by drawing the bond formed between (A) and (B) elements and mention the name of the formed compound.

23. "A , B , C and D" are four elements, whose atomic numbers are "1 , 11 , 10 and 17 " respectively.

1. Classify them into metal, nonmetal and noble gas.
2. Show by drawing how two atoms of (A) form a covalent bond.
3. What is the type of bond when (B) combines with (D) ?
4. What is the type of bond when two atoms of (D) combine together ?
5. Explain why element (C) doesn't undergo chemical reaction under normal conditions ?

24. Mention the atomic no. and the type of element with drawing a diagram showing the electronic configuration for each atom of the following :

1. An element atom that gains two electrons in the outermost energy level (L) during the chemical reaction.
2. An element atom whose electrons distribute in 4 energy levels and its ion carries one positive charge.
3. An element atom whose electrons distribute in 3 energy levels and the symbol of its ion is (X^{-3}).
4. An element atom loses two electrons during the chemical reaction, so (M) level becoms the outermost energy level of its ion.

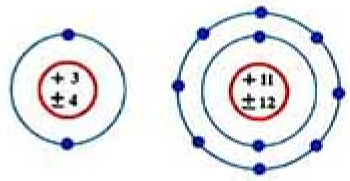
Timss Questions



1. Choose the correct answer :

1. The cables of electric wires are made up of an element, its atomic number is ....
   a. 10 b. 7 c.13 d. 17

2. From the opposite two figures :
   The charge of each of the two ions is ....



   a. –2 b. –1
   c. +1 d. +2

3. The number of electrons in the outermost energy level of oxygen ion equals the number of electrons in the outermost energy level of ....
   a. ($^{40}_{20}Ca$) ion. b. ($^{14}_{7}N$) atom. c. ($^{35}_{17}Cl$) atom. d. ($^{32}_{16}S$) atom.

4. The electronic configuration of potassium ($_{19}K$) ion is similar to the electronic configuration of .... ion.
   a. $_8O$ b. $_{11}Na$ c. $_{18}Ar$ d. $_{17}Cl$

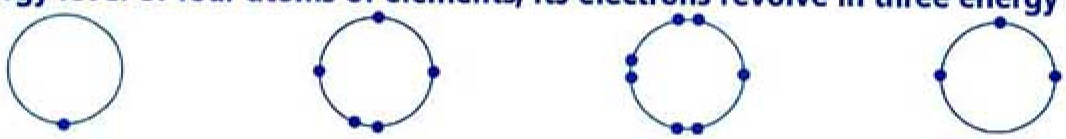
5. The element, whose atomic number is .... forms an ionic bond with oxygen.
   a. 2 b. 10 c. 12 d. 16

6. Nonmetal element its nucleus contains 18 neutrons , its electrons revolve in 3 energy levels and it tends to gain one electron during chemical reactions, its mass no. equal ....
   a. 17 b. 18 c. 35 d. 40

2. Give reasons for :

1. Jewellery is made up of some metallic elements.
2. Some metals are used in manufacturing some cooking pots.

3. The following figures represent the electronic configuration of the outermost energy level of four atoms of elements, its electrons revolve in three energy levels.



Element (S) | Element (R) | Element (Q) | Element (P)

Answer the following questions :

1. What are the elements which are considered from metals ?
2. What is the element which forms an ion from the type (M^{+3}) ?
3. What is the type of the ion which the element (R) forms ? (Give a reason).
4. What is the element, whose nucleus contain 11 protons ? (Give a reason).

LESSON 2

Chemical Compounds



What is meant by valency ?

- *The atoms of nobel elements are the most stable atoms due to the completeness of their outermost energy level with electrons.*
- *The atoms of other elements tend to enter in chemical reactions to reach the stable state to become their outermost energy levels completed with electrons by :*
  - *Losing the outermost electrons as in metals.*
  - *Gaining or sharing with electrons as in nonmetals.*
- *This number of electrons is known as "Valency".*

Valency

It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

GR.

The valency of noble gases is zero.

Because their outermost energy level is completely filled with electrons [have 8 electrons except (He) has 2 electrons].

➲ **The valency of an element is determined according to the number of electrons in the outermost energy level of its atom as in the following table :**

Element	Electronic configuration K	L	M	Valency
Sodium $^{23}_{11}Na$	2	8	①	**Monovalent (1)** GR/ Because it ***loses*** one electron during the chemical reaction.
Chlorine $^{35}_{17}Cl$	2	8	⑦	**Monovalent (1)** GR/ Because it ***gains or shares*** with one electron during the chemical reaction.
Oxygen $^{16}_{8}O$	2	⑥		**Divalent (2)** GR/ Because it ***gains or shares*** with two electrons during the chemical reaction.
Magnesium $^{24}_{12}Mg$	2	8	②	**Divalent (2)** GR/ Because it ***loses*** two electrons during the chemical reaction.
Aluminium $^{27}_{13}Al$	2	8	③	**Trivalent (3)** GR/ Because it ***loses*** three electrons during the chemical reaction.
Argon $^{40}_{18}Ar$	2	8	⑧	**Zero** GR/ Because its outermost electron shell ***is completely*** filled with electrons.

UNIT 1

➲ **The following table shows the valencies of some metallic elements :**

Metallic element				Valency
Lithium	Li	Potassium	K	Monovalent (1)
Sodium	Na	Silver	Ag	
Calcium	Ca	Magnesium	Mg	Divalent (2)
Lead	Pb	Mercury	Hg	
Zinc	Zn			
Aluminium	Al	Gold	Au	Trivalent (3)

➲ **Some metallic elements have more than one valency such as :**

Copper (Cu)
- Copper I "Monovalent"
- Copper II "Divalent"

Iron (Fe)
- Iron II (Ferrous Fe^{+2}) "Divalent"
- Iron III (Ferric Fe^{+3}) "Trivalent"

➲ The following table shows the valencies of some nonmetallic elements :

Nonmetallic element				Valency
Hydrogen	H	Chlorine	Cl	Monovalent (1)
Fluorine	F	Bromine	Br	
Iodine	I			
Oxygen			O	Divalent (2)
Carbon			C	Tetravalent (4)

➲ Some nonmetallic elements have more than one valency such as :

Sulphur (S) →
- Divalent (2)
- Tetravalent (4)
- Hexavalent (6)

Nitrogen (N) → and **Phosphorus** (P) →
- Trivalent (3)
- Pentavalent (5)

The atomic group

The atomic group (Radical)

It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and isn't existed solely (individually).

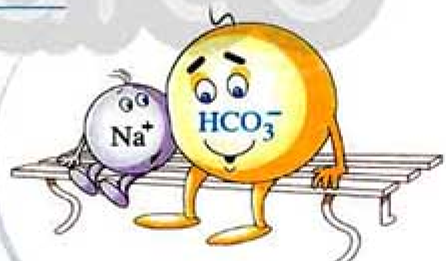
NB The valency of an atomic group equals the number of charges which it carries.

➲ The following table shows the valencies of some atomic groups :

Atomic group	Formula	Valency
Hydroxide	$(OH)^{-}$	Monovalent (1)
Bicarbonate	$(HCO_3)^{-}$	
Nitrate	$(NO_3)^{-}$	
Nitrite	$(NO_2)^{-}$	
Ammonium	$(NH_4)^{+}$	
Carbonate	$(CO_3)^{-2}$	Divalent (2)
Sulphate	$(SO_4)^{-2}$	
Phosphate	$(PO_4)^{-3}$	Trivalent (3)

Example : Bicarbonate group $(HCO_3)^{-}$

- Its valency is **monovalent**.
- It consists of **5 atoms of 3 elements** :
  - One atom of hydrogen element (H).
  - One atom of carbon element (C).
  - Three atoms of oxygen element (O).



Atomic group isn't existed individually

GR.

- ***Both nitrate and carbonate groups have the same number of atoms, but differ in their valencies.***

Because nitrate group $(NO_3)^{-}$ consists of four atoms and it is a monovalent group, while carbonate group $(CO_3)^{-2}$ consists of four atoms but it is a divalent group.

Exercise 1

Put (less than - more than or equal to) in the following spaces : [Answer by yourself].

1. The number of atoms forming nitrate group is .... the number of elements forming bicarbonate group.
2. The number of elements forming hydroxide group is .... the number of its atoms.
3. The number of atoms forming carbonate group is .... the number of atoms forming sulphate group.
4. The number of elements forming phosphate group is .... the number of atoms forming ammonium group.
5. The number of atoms forming nitrite group is .... the number of atoms forming nitrate group.

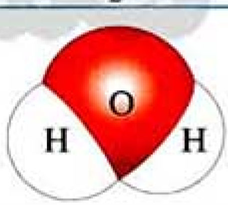
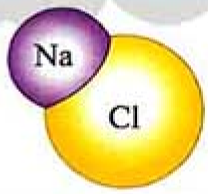
Chemical formula

We can express a molecule of a chemical compound via a certain formula known as chemical formula.

Chemical formula

It is a formula that represents the number and the type of the atoms in a molecule.

Examples :

P.O.C.	Water molecule	Sodium chloride molecule
Chemical formula :	H_2O	NaCl
Illustrating figure :		
No. of elements in molecule :	**Two elements :** • Hydrogen (H). • Oxygen (O).	**Two elements :** • Sodium (Na). • Chlorine (Cl).
No. of atoms in molecule :	**Three atoms :** • Two atoms of hydrogen element (H). • One atom of oxygen element (O).	**Two atoms :** • One atom of sodium element (Na). • One atom of chlorine element (Cl).

UNIT 1

What is meant by ? The chemical formula of sodium chloride molecule is (NaCl).

- This is mean that the molecule of (NaCl) is consists of one atom of sodium element (Na) and one atom of chlorine element (Cl).

How can you write a chemical formula for a compound ?

- **We follow the following steps :**

Steps	Examples		
1 Write the name of the compound in words.	Calcium oxide	Magnesium hydroxide	Aluminium oxide
2 Write the symbol of each element or atomic group down to its name.	Ca O	Mg OH	Al O
3 - Write the valency down to each symbol or atomic group. - Exchange the valencies	2 2	2 1	3 2
4 - Simplify the valencies (shortened as much as possible). - You don't have to write the one (1) - In case of atomic groups if the number is not (1), put the atomic group between brackets and write the number right down to it.	$Ca_{\not{2}_1} O_{\not{2}_1}$ CaO	$Mg_1(OH)_2$ $Mg(OH)_2$	$Al_2 O_3$ Al_2O_3

NB

*** The formula of a compound**

Starts from left with :
A symbol of metal.
or
Hydrogen.
or
A positive atomic group.

Ends on right with :
A symbol of nonmetal.
or
A negative atomic group.

* The word "oxide" means the combination of the metallic element or nonmetallic element with oxygen element.

Exercise 2

Write the chemical formula for each of the following molecules and mention the number of forming elements and the number of atoms in each molecule.

1. Hydrogen chloride.
2. Sodium hydroxide.
3. Magnesium sulphate.
4. Calcium carbonate.
5. Sodium carbonate.
6. Aluminium sulphate.
7. Sodium oxide.
8. Calcium sulphate.
9. Sodium nitrate.
10. Aluminium carbonate.
11. Carbon dioxide.
12. Sodium sulphate.
13. Copper carbonate.

Answer

Compound	Chemical formula	No. of elements forming the molecule	No. of atoms in the molecule
1. Hydrogen chloride	H Cl 1 1 HCl	2	2
2. Sodium hydroxide	Na OH 1 1 NaOH	3	3
3. Magnesium sulphate	Mg SO_4 2 2 $MgSO_4$	3	1 + 1 + 4 = 6
4. Calcium carbonate	Ca CO_3 2 2 $CaCO_3$	3	1 + 1 + 3 = 5
5. Sodium carbonate	Na CO_3 1 2 Na_2CO_3	3	2 + 1 + 3 = 6

6. Aluminium sulphate	Al SO$_4$ 3 2 $Al_2(SO_4)_3$	3	2 + 3 + 12 = 17
7. Sodium oxide	Na O 1 2 Na_2O	2	3
8. Calcium sulphate	Ca SO$_4$ ~~2~~ ~~2~~ $CaSO_4$	3	1 + 1+4 = 6
9. Sodium nitrate	Na NO$_3$ 1 1 $NaNO_3$	3	1 + 1+ 3 = 5
10. Aluminium carbonate	Al CO$_3$ 3 2 $Al_2(CO_3)_3$	3	2 + 3 + 9 = 14
11. Carbon dioxide	C O 2 ~~4~~ ~~2~~ 1 CO_2	2	3
12. Sodium sulphate	Na SO$_4$ 1 2 Na_2SO_4	3	2 + 1 + 4 = 7
13. Copper carbonate	Cu CO$_3$ ~~2~~ ~~2~~ $CuCO_3$	3	1 + 1 + 3 = 5

GR.

- ***An oxygen atom joins two atoms of sodium when composing one molecule of sodium oxide (Na_2O).***

  Because oxygen is divalent, while sodium is monovalent.
- ***The chemical formula of sodium carbonate is (Na_2CO_3).***

  Because sodium is monovalent, while carbonate is divalent group.

Exercise 3

Complete the following table with suitable chemical formulae :

	Silver	Zinc	Iron III
Nitrate	.... (1)	.... (2)	$Fe(NO_3)_3$
Sulphate	.... (3)	$ZnSO_4$	.... (4) ....
Phosphate	Ag_3PO_4	.... (5)	.... (6) ....

Answer

(1) $AgNO_3$ (2) $Zn(NO_3)_2$ (3) Ag_2SO_4

(4) $Fe_2(SO_4)_3$ (5) $Zn_3(PO_4)_2$ (6) $FePO_4$

TRY TO ANSWER worksheet 3 in the Notebook

Types of compounds

- In nature, there is a countless number of existing compounds.
- Compounds can be classified according to their properties into :

1 Acids



2 Bases (Alkalis)



3 Oxides



4 Salts



UNIT 1

1 Acids

Acids

They are substances (materials) which dissociate in water producing positive hydrogen ions H^+

The chemical formula for all mineral acids begins with hydrogen joined with :

One of the negative atomic groups [except $(OH)^-$ group]

Examples :
- Sulphuric acid (H_2SO_4).
- Nitric acid (HNO_3).

One of nonmetal elements [except oxygen]

Examples :
- Hydrochloric acid (HCl).
- Hydrobromic acid (HBr).

Properties of acids

1 They have a sour taste.



Lemon has a sour taste

2 They change the colour of blue litmus paper into red.



due to — due to

The presence of the positive hydrogen ions H^+

▸ Enrichment information

- Acids are classified according to their **strength** [degree of ionization] into :
  - **Strong acids :** such as hydrochloric acid (HCl) & nitric acid (HNO_3).
  - **Weak acids :** such as carbonic acid (H_2CO_3).
- Acids are classified according to their **stability** [boiling point and the difficulty of its decomposition] into :
  - **Stable acids :** such as sulphuric acid (H_2SO_4) [It is the most stable acid due to its high boiling point].
  - **Unstable acids :** such as carbonic acids (H_2CO_3).

2 Bases

Bases

They are substances which dissociate in water producing negative hydroxide ions $(OH)^-$

- The chemical formula of all bases (alkalis) ends with $(OH)^-$ group.

Examples of some bases :

- Sodium hydroxide [caustic soda] (NaOH).
- Potassium hydroxide (KOH).
- Calcium hydroxide [limewater] $(Ca(OH)_2)$.

Properties of bases (alkalis)

1 Their aqueous solutions have a bitter taste and feel slippery.



Cantaloupe has a bitter taste

2 They change the colour of red litmus paper into blue.



due to

The presence of the negative hydroxide ions $(OH)^-$

Exercise 4

If you have two unmarked tubes, one contains an acid and the other contains a base. How can you distinguish between them ?

Answer

By putting two litmus papers (red and blue) in each tube.

- If the colour of the blue litmus paper changes into red, the tube contains the acid.
- If the colour of the red litmus paper changes into blue, the tube contains the base.



Warning

Don't touch acids or even bases with your bare hands as they have corrosive effect on skin.

Comparison between acids and bases :

P.O.C.	Acids	Bases
1. Definition :	They are substances which dissociate in water producing positive hydrogen ions H^+	They are substances which dissociate in water producing negative hydroxide ions $(OH)^-$
2. Symbol :	The symbol of all the mineral acids begins with hydrogen H.	The symbol of all alkalis ends with $(OH)^-$ group.
3. Taste :	They have a sour taste.	They have a bitter taste.
4. The effect on litmus paper :	They change the colour of litmus paper into red due to the presence of the positive hydrogen ions H^+	They change the colour of litmus paper into blue due to the presence of the negative hydroxide ions $(OH)^-$
5. Examples :	H_2SO_4 & HCl	NaOH & $Ca(OH)_2$

3 Oxides

Oxides

They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.

Oxides are classified into

1 Metal oxides

They are formed from the combination of oxygen with a metal.

Examples :

- Sodium oxide (Na_2O).
- Aluminium oxide (Al_2O_3).

2 Nonmetal oxides

They are formed from the combination of oxygen with a nonmetal.

Examples :

- Carbon dioxide (CO_2).
- Sulphur trioxide (SO_3).

4 Salts

- Salts exist within the components of the Earth's crust or dissolved in water of seas and oceans.

Salts

They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

Salts are produced from the combination of

1 Positive metal ion *with*

A Negative nonmetal ion

Examples :
- Sodium chloride [Table salt] $NaCl$
- Lead bromide $PbBr_2$

B Negative atomic group

Examples :
- Sodium nitrate $NaNO_3$
- Unhydrous copper sulphate $CuSO_4$

2 Positive atomic group *with*

A Negative nonmetal ion

Examples :
- Ammonium chloride NH_4Cl
- Ammonium bromide NH_4Br

B Negative atomic group

Examples :
- Ammonium carbonate $(NH_4)_2CO_3$
- Ammonium nitrate NH_4NO_3

NB All of negative ions form salts except the negative oxygen ion (oxide O^{--}).

Properties of salts :

- Salts are variant in some of their properties such as : taste , colour , smell , solubility in water and others.
- Salts differ according to the solubility in water into :

A Salts dissolve (soluble) in water

Ex.:
- Sodium chloride ($NaCl$).
- Potassium sulphate (K_2SO_4).
- Calcium nitrate ($Ca(NO_3)_2$).
- Sodium sulphide (Na_2S).

B Salts do not dissolve (insoluble) in water

Ex.:
- Silver chloride ($AgCl$).
- Lead iodide (PbI_2).
- Lead sulphate ($PbSO_4$).

NB All of carbonate salts don't dissolve in water except sodium carbonate , potassium carbonate and ammonium carbonate.

TRY TO ANSWER worksheets in the Notebook **4 & 5**

Remember



- **Valency :** It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

- **The following tables show the valencies of some metallic and nonmetallic elements.**

Metallic element	Symbol	Valency
Lithium	(Li)	Monovalent (1)
Potassium	(K)	
Sodium	(Na)	
Silver	(Ag)	
Copper I	(Cu)	
Calcium	(Ca)	Divalent (2)
Magnesium	(Mg)	
Iron II	(Fe)	
Lead	(Pb)	
Copper II	(Cu)	
Mercury	(Hg)	
Zinc	(Zn)	
Aluminium	(Al)	Trivalent (3)
Gold	(Au)	
Iron III	(Fe)	

Nonmetallic element	Symbol	Valency
Hydrogen	(H)	Monovalent (1)
Chlorine	(Cl)	
Fluorine	(F)	
Bromine	(Br)	
Iodine	(I)	
Sulphur	(S)	Divalent (2)
Oxygen	(O)	
Nitrogen	(N)	Trivalent (3)
Phosphorus	(P)	
Sulphur	(S)	Tetravalent (4)
Carbon	(C)	
Nitrogen	(N)	Pentavalent (5)
Phosphorus	(P)	
Sulphur	(S)	Hexavalent (6)

- **The atomic group :** It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it isn't existed solely (individually).

- **The opposite table shows the valencies of some atomic groups :**

Atomic group	Formula	Valency
Hydroxide	$(OH)^-$	Monovalent (1)
Bicarbonate	$(HCO_3)^-$	
Nitrate	$(NO_3)^-$	
Nitrite	$(NO_2)^-$	
Ammonium	$(NH_4)^+$	
Carbonate	$(CO_3)^{-2}$	Divalent (2)
Sulphate	$(SO_4)^{-2}$	
Phosphate	$(PO_4)^{-3}$	Trivalent (3)

- **Chemical formula :** It is a formula that represents the number and the type of atoms in a molecule.

- **The following table shows the chemical formulae of some compounds :**

Compound	Chemical formula
Sodium hydroxide	$NaOH$
Magnesium sulphate	$MgSO_4$
Sodium oxide	Na_2O
Sodium carbonate	Na_2CO_3
Aluminium sulphate	$Al_2(SO_4)_3$
Calcium phosphate	$Ca_3(PO_4)_2$
Sodium nitrate	$NaNO_3$
Aluminium hydroxide	$Al(OH)_3$
Magnesium hydroxide	$Mg(OH)_2$
Aluminium carbonate	$Al_2(CO_3)_3$
Copper carbonate	$CuCO_3$

Compound	Chemical formula
Copper nitrate	$Cu(NO_3)_2$
Sulphuric acid	H_2SO_4
Copper sulphate	$CuSO_4$
Ammonium chloride	NH_4Cl
Nitric acid	HNO_3
Magnesium oxide	MgO
Aluminium oxide	Al_2O_3
Silver chloride	$AgCl$
Calcium nitrate	$Ca(NO_3)_2$
Hydrochloric acid	HCl
Sulphur trioxide	SO_3

- **Acids :** They are substances dissociated in water producing positive hydrogen ions H^+ [**Ex.:** $HCl - H_2SO_4 - HNO_3$].

- **Bases :** They are substances dissociated in water producing negative hydroxide ions $(OH)^-$ [**Ex.:** $NaOH - KOH - Ca(OH)_2$].

- **Oxides :** They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.

- **Metal oxides :** They are compounds produced from the combination of oxygen with a metal [**Ex.:** $Na_2O - CaO - Al_2O_3$].

- **Nonmetal oxides :** They are compounds produced from the combination of oxygen with a nonmetal. [**Ex.:** $CO_2 - SO_3$].

- **Salts :** They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

Questions

on lesson two



Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. ………… elements are the most stable elements.
   a. Metals b. Nonmetals c. Noble gases d. Metalloids
2. When a nonmetal gains or shares by two electrons, its valency will be …………
   a. monovalent. b. divalent. c. trivalent. d. tetravalent.
3. All of the following elements are monovalent except …………
   a. hydrogen. b. sodium. c. oxygen. d. chlorine.
4. All of the following elements are divalent except …………
   a. $_{12}Mg$ b. $_{7}N$ c. $_{8}O$ d. $_{16}S$
5. When an atom loses, gains or shares by one electron, its valency is …………
   a. monovalent. b. divalent. c. trivalent. d. tetravalent.
6. The valency of ferrous is …………
   a. monovalent. b. divalent. c. trivalent. d. tetravalent.
7. All of the following are nonmetals having more than one valency except …………
   a. copper. b. phosphorus. c. sulphur. d. nitrogen.
8. In trivalent elements, the outermost energy level contains ………… electrons.
   a. (3) or (5) b. (5) or (6) c. (7) or (1) d. (6) or (3)
9. The valency of argon ($_{18}Ar$) is …………
   a. trivalent. b. divalent. c. monovalent. d. zero.
10. The valency of copper in (Cu_2O) is …………
    a. monovalent. b. divalent. c. trivalent. d. tetravalent.
11. The chemical formula of carbonate group is …………
    a. $(NO_3)^-$ b. $(SO_4)^{--}$ c. $(NH_4)^+$ d. $(CO_3)^{--}$
12. All of the following are monovalent atomic groups except ………… group.
    a. phosphate b. nitrate c. hydroxide d. bicarbonate
13. Which of the following is a trivalent atomic group ? …………
    a. Hydroxide. b. Sulphate. c. Ammonium. d. Phosphate.
14. Nitrate and nitrite groups are different in the …………
    a. type of atoms. b. number of atoms. c. valency. d. type of charge.
15. Phosphate and sulphate groups are similar in the …………
    a. type of atoms. b. valency. c. number of atoms. d. no correct answer.

16. The nitrate group is a .... radical.

a. monovalent b. divalent c. trivalent d. tetravalent

17. All of these atomic groups carry the same charge except ....

a. nitrite. b. nitrate. c. bicarbonate. d. ammonium.

18. The molecules of sodium hydroxide, water and sulphuric acid share in the presence of .... in each of them.

a. hydrogen and nitrogen
b. oxygen and sodium
c. hydrogen and oxygen
d. hydrogen and sodium

19. The chemical formula of carbon dioxide(CO_2) shows that the valency of carbon is ....

a. monovalent. b. divalent. c. trivalent. d. tetravalent.

20. Element (M) form a compound $M(OH)_3$ so, its valency is ....

a. monovalent. b. divalent. c. trivalent. d. tetravalent.

21. The chemical formula of calcium bicarbonate is ....

a. $CaCO_3$ b. $CaH(CO_3)_2$ c. $Ca(HCO_3)_2$ d. Ca_2HCO_3

22. Each aluminium atom ($_{13}Al$) combines with .... atoms of chlorine ($_{17}Cl$) to form aluminium chloride molecule.

a. two b. three c. four d. five

23. The chemical formula of sodium hydroxide is ....

a. NaOH b. $NaCO_3$ c. $NaHCO_3$ d. $Na_2(CO_3)_2$

24. The chemical formula of sulphuric acid is ....

a. H_2O b. HCl c. H_2SO_4 d. HNO_3

25. Sulphuric acid is composed of ....

a. five atoms of three different elements.
b. six atoms of three different elements.
c. seven atoms of three different elements.
d. eight atoms of four different elements.

26. In ammonia molecule (NH_3), the number 3 refers to the number of ....

a. N & H atoms in one molecule.
b. H atoms in one molecule.
c. the valency of hydrogen.
d. N atoms in one molecule.

27. The chemical formula of sodium nitrite is ....

a. NaNO b. $NaNO_3$ c. $NaNO_2$ d. Na_2NO_3

28. In the compound $X(NO_3)_2$, the valency of element (X) is ....

a. monovalent. b. divalent. c. trivalent. d. tetravalent.

29. The number of atoms in ammonium nitrate molecule equals ....

a. 5 b. 7 c. 8 d. 9

30. When an acid dissolves in water, it produces ………… ions.

a. $(OH)^+$ b. H^- c. H^+ d. $(OH)^-$

31. When an alkali (base) dissolves in water, it gives ………… ions.

a. H^+ b. $(OH)^-$ c. $(OH)^{-2}$ d. $(OH)^+$

32. All of these substances turn litmus paper into red except …………

a. HCl b. HNO_3 c. NaOH d. H_2SO_4

33. Mona bought a cup of yogurt and found the taste is sour, so she concluded that it contains a compound from …………

a. acids. b. bases. c. salts. d. oxides.

34. All of these substances turn litmus paper into blue except …………

a. NaOH b. KOH c. $Ca(OH)_2$ d. HBr

35. All of the aqueous solutions of the following compounds have bitter taste except …………

a. sodium hydroxide. b. sulphuric acid.
c. calcium hydroxide. d. potassium hydroxide.

36. All of these are nonmetal oxides except …………

a. CO_2 b. P_2O_5 c. SO_3 d. Al_2O_3

37. Sodium chloride is …………

a. an acid. b. an oxide. c. a base. d. a salt.

38. The salt that is formed on the combination of a positive metal ion with a negative atomic group is …………

a. NaCl b. Na_2CO_3 c. $(NH_4)_2SO_4$ d. NaBr

39. On the combination of $(Mg)^{+2}$ ion with $(CO_3)^{-2}$ group, ………… is formed.

a. an acid b. a base c. an oxide d. a salt

40. The salt that is formed on the combination of a positive atomic group with a negative atomic group is …………

a. NH_4Cl b. $(NH_4)_2CO_3$ c. Na_2SO_4 d. NH_4Br

41. Ammonium chloride salt is formed on the combination of …………

a. a positive metal ion with a negative atomic group.
b. a positive metal ion with a negative nonmetal ion.
c. a negative nonmetal ion with a positive atomic group.
d. a negative nonmetal ion with a negative nonmetal ion.

42. All of these salts dissolve in water except …………

a. sodium chloride. b. potassium sulphate.
c. silver chloride. d. sodium sulphide.

2. Choose from column (B) what suits it in column (A) :

(A)	(B)
1. $(PO_4)^{-3}$	a. Nitrate group.
2. $(OH)^{-}$	b. Bicarbonate group.
3. $(CO_3)^{-2}$	c. Nitrite group.
4. $(NO_3)^{-}$	d. Sulphate group.
5. $(SO_4)^{-2}$	e. Carbonate group.
6. $(HCO_3)^{-}$	f. Ammonium group.
7. $(NO_2)^{-}$	g. Phosphate group.
8. $(NH_4)^{+}$	h. Hydroxide group.

3. Choose from columns (B) & (C) what suits it in column (A) :

1.

(A)	(B)	(C)
1. Sulphuric acid	a. H_2SO_4	A. A salt dissolves in water.
2. Sodium sulphide	b. Na_2S	B. Its solution changes the colour of litmus paper into blue.
3. Lead iodide	c. PbI_2	C. Its solution changes the colour of litmus paper into red.
4. Potassium hydroxide	d. KOH	D. A salt doesn't dissolve in water.

2.

(A) (Common name)	(B) (Chemical name)	(C) (Chemical formula)
1. Caustic soda	a. Calcium hydroxide.	A. NaOH
2. Table salt	b. Sodium chloride.	B. $Ca(OH)_2$
3. Limewater	c. Sodium hydroxide.	C. NaCl

4. Put (✓) or (✗) in front of the following statements and correct the wrong ones :

1. An element of atomic number 20 , so its valency is divalent. ( )
2. Ferrous carries three negative charges. ( )
3. Water molecule consists of four atoms for two elements. ( )
4. The valency of noble gases is monovalent. ( )
5. The atomic group acts as a compound in the chemical reaction. ( )

6. Both nitrate and nitrite groups have the same valency. ( )
7. The chemical formula indicates the type and the number of atoms in a certain molecule. ( )
8. The chemical formula of carbonate group is $(HCO_3)^-$ ( )
9. In the compound (XY_2), (Y) is divalent and (X) is monovalent. ( )
10. A compound (X_2O_3), then the valency of element (X) is monovalent. ( )
11. Both lithium bicarbonate and sodium carbonate have the same number of atoms. ( )
12. The molecule of sodium sulphate consists of three different elements. ( )
13. The chemical formula of calcium carbonate is $(CaCO_3)$. ( )
14. The chemical formula of aluminium sulphate is $Al_3(SO_4)_2$ ( )
15. (SO_2) is the symbol of sodium oxide. ( )
16. The chemical formula of silver nitrate is $(AgNO_3)$ ( )
17. The valency of sodium in (NaCl) is monovalent, while it is divalent in (Na_2CO_3). ( )
18. Table salt is formed of two divalent elements. ( )
19. The chemical formula of calcium hydroxide molecule is (CaOH). ( )
20. The chemical formula of nitric acid is (HNO_3), while that of sulphuric acid is (H_2S). ( )
21. The valency of sulphur in sulphur trioxide (SO_3) is tetravalent. ( )
22. Oxides are substances that dissociate in water producing positive hydrogen ions. ( )
23. Sodium hydroxide changes the colour of litmus paper into red. ( )
24. Mineral acids are formed when hydrogen joined with a negative atomic group except nitrate group. ( )
25. When an element $({}_{11}Z)$ combines with oxygen, it produces (ZO) oxide which is a metal oxide. ( )
26. Aluminium oxide is a metal oxide, while carbon dioxide is a nonmetal oxide. ( )
27. Caustic soda and limewater are from bases, while magnesium carbonate is from salts. ( )
28. The combination of metals with oxygen form oxides, while its combination with nonmetals form bases. ( )
29. Sodium chloride is considered a base. ( )
30. Silver chloride is water soluble, while sodium chloride is water insoluble. ( )

5. Write the scientific term of each of the following :

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
2. Elements, their valencies are zero.

3. A set of atoms joined together, behave like one atom only, having a certain valency and it can't be existed solely.
4. A formula represents the number and the type of atoms in a molecule.
5. • Compounds are dissolved (dissociated) in water producing positive hydrogen ions H^+.
   • Compounds have sour taste and turn litmus paper into red.
6. • Compounds (substances) are dissociated in water producing negative hydroxide ions $(OH)^-$.
   • Compounds have bitter taste and turn litmus paper into blue.
7. Compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
8. Oxides produced due to the combination of oxygen with a metal.
9. Oxides produced due to the combination of oxygen with a nonmetal.
10. Compounds produced as a result of the chemical combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

6. Complete the following statements :

1. The valency of metals may be ………… , ………… or trivalent as their outermost energy shells have 1 , 2 or 3 electrons.
2. The valency of aluminium ($^{27}_{13}Al$) is …………, while that of calcium ($^{40}_{20}Ca$) is …………
3. Some metallic elements have more than one valency, such as ………… and …………
4. The valency of iron is ………… in ferrous chloride, while in ferric chloride is …………
5. Some nonmetallic elements have more than one valency such as …………, ………… and …………
6. The valency of a sulphur atom may be …………, ………… or …………
7. Phosphorus element has two valencies which are ………… and …………
8. The valency of noble gases is ………… as their outermost energy level is ………… with electrons.
9. The valency of ($^{39}_{19}K$) is ………… , while the valency of $(SO_4)^{-2}$ is …………
10. ………… and ………… are examples of monovalent atomic groups, while ………… and ………… are examples of divalent atomic groups.
11. The valency of a carbonate group is …………, while that of a bicarbonate group is …………
12. The symbol of phosphate group is ………… and its valency is …………

13. The symbol of sulphate group is ………… and it is formed of ………… atoms of ………… different elements.
14. The difference between nitrate group and nitrite group is one ………… atom.
15. The chemical formula of sodium carbonate is ………… and it consists of ………… atoms of ………… different elements.
16. If the chemical formula of aluminium sulphate is $Al_2(SO_4)_3$, so the valency of aluminium atom is …………, while the valency of sulphate group is …………
17. The chemical formula of magnesium sulphate is ………… , while that of calcium nitrate is …………
18. The chemical formula of hydrochloric acid is ………… , but the chemical formula of sodium hydroxide is …………
19. The chemical formula of water is ………… , but the chemical formula of sulphuric acid is …………
20. A compound has a chemical formula (XO_2) , so the valency of (X) is …………
21. The valency of calcium is ………… and when it combines with phosphate group, a compound is formed its formula is …………
22. (Na_2O) is the chemical formula of …………, while the chemical formula of magnesium carbonate is …………
23. The valency of sodium in sodium carbonate (Na_2CO_3) is ………… and its valency in sodium chloride (NaCl) is …………
24. Compounds are classified according to their properties into …………, bases, ………… and …………
25. On dissolving in water, acids give positive ………… ions and alkalis give negative ………… ions.
26. Acids have ………… taste and change the colour of litmus paper into …………, while bases have ………… taste and change the colour of litmus paper into …………
27. ………… and ………… are examples of bases.
28. ………… is from acids that contain oxygen, while ………… is from acids that doesn't contain oxygen.
29. (H_2SO_4) is …………, while (NaOH) is …………
30. The symbols of all mineral acids begin with ………… atom, while the symbols of all bases end with ………… group.
31. ………… is an example of metal oxides, while ………… is an example of nonmetal oxides.
32. Sodium sulphide is from the salts that ………… in water, while lead sulphate is from the salts that ………… in water.

7. Complete the following table :

Compound	Chemical formula	No. of atoms in the molecule	No. of elements forming the molecule	Its type
1. Sodium carbonate	....	....	....	....
2.	$CuCO_3$	....	....	....
3. Sodium hydroxide	....	....	3	....
4.	$Al_2(SO_4)_3$	17	....	....
5. Calcium oxide	....	....	....	....
6.	$Mg(NO_3)_2$	....	3	....
7. Copper nitrite	....	....	....	....
8. Aluminium hydroxide	....	7	....	....
9.	$CaCO_3$	....	....	....
10. Sulphuric acid	....	....	....	....
11.	MgO	....	....	....
12. Sodium phosphate	....	....	....	....

8. Give reasons for :

1. Potassium ($_{19}K$) is monovalent, while oxygen ($_8O$) is divalent.
2. Both sodium ($_{11}Na$) and chlorine ($_{17}Cl$) are monovalent although they have different atomic numbers.
3. The valency of noble gases is zero.
4. Magnesium ($_{12}Mg$) is divalent, while aluminium ($_{13}Al$) is trivalent.
5. Both nitrate and carbonate groups have the same number of atoms, but differ in their valencies.
6. Both nitrite and nitrate groups differ in the number of atoms and having the same valency.
7. An oxygen atom combines with two atoms of sodium when composing one molecule of sodium oxide.
8. The chemical formula of sodium carbonate is (Na_2CO_3).
9. The chemical formula of water is (H_2O).
10. Acids have an effect on litmus paper which is different from bases.
11. All acids turn the colour of litmus into red and having a sour taste, while all bases turn the colour of litmus into blue with a bitter taste.
12. We can obtain sodium chloride (NaCl) solution and not silver chloride (AgCl) solution.
13. Caustic soda is from bases, while lead bromide is from salts.

9. What is meant by each of the following ... ?

1. Valency.
2. Magnesium ($_{12}Mg$) is a divalent element.
3. Fe^{+3}
4. A trivalent nonmetallic element.
5. Atomic group.
6. Chemical formula.
7. Acids.
8. Bases.
9. Oxides.
10. Metal oxides.
11. Nonmetal oxides.
12. Salts.

10. Choose the odd word (or formula) and mention the relation between the rest :

1. Lithium / Silver / Aluminium / Sodium.
2. Calcium / Magnesium / Lead / Oxygen.
3. Phosphorus / Nitrogen / Sulphur / Chlorine.
4. Bromine / Chlorine / Iodine / Potassium.
5. Zinc / Calcium / Mercury / Aluminium / Lead.
6. Ammonium / Phosphate / Carbonate / Nitrate.
7. $NaOH$ / $Ca(OH)_2$ / KOH / HCl
8. Al_2O_3 / SO_3 / SO_2 / CO_2
9. K_2O / Al_2O_3 / SO_3 / CaO
10. H_2O / HBr / HCl / HNO_3
11. $NaCl$ / K_2SO_4 / $AgCl$ / Na_2S

11. Give an example of each of the following :

1. A monovalent metallic element.
2. A monovalent nonmetallic element.
3. A divalent nonmetallic element.
4. A trivalent nonmetallic element.
5. An element, its valency is zero.
6. A monovalent atomic group.
7. A trivalent atomic group.
8. A divalent atomic group.
9. A base.
10. An acid doesn't contain oxygen.
11. A metal oxide.
12. An acid contains oxygen.
13. Water insoluble salt.
14. Water soluble salt.
15. A compound turns the red litmus paper into blue.

12. Write the names of the following compounds and mention the number of atoms for each :

1. $CaSO_4$
2. $LiHCO_3$
3. $Mg(OH)_2$
4. H_2SO_4
5. Na_3PO_4
6. KNO_3

7. $Mg_3(PO_4)_2$
8. 📖 CO_2
9. 📖 $Al_2(SO_4)_3$
10. 📖 $NaNO_3$
11. 📖 $Ca(OH)_2$
12. $Ca_3(PO_4)_2$
13. 📖 $CaCO_3$
14. HCl

13. Write the chemical formula of the following compounds :

1. Sodium hydroxide.
2. Sodium bicarbonate.
3. 📖 Sodium sulphate.
4. 📖 Copper nitrate.
5. 📖 Magnesium oxide.
6. Nitric acid.
7. 📖 Sulphuric acid.
8. Calcium hydroxide (Limewater).
9. Calcium bicarbonate.
10. Calcium sulphate.
11. Iron II (ferrous) oxide.
12. Potassium chloride.
13. 📖 Copper sulphate.
14. 📖 Aluminium oxide.
15. 📖 Calcium nitrate.
16. Silver nitrate.
17. Silver chloride.
18. Hydrochloric acid.
19. Table salt.
20. 📖 Calcium chloride.
21. 📖 Aluminium hydroxide.
22. Ammonium chloride.
23. Potassium sulphate.
24. 📖 Sodium carbonate.
25. Sodium oxide.
26. Potassium carbonate.
27. Sulphur trioxide.
28. Water.

14. Mention the properties of :

1. Acids.
2. Bases.

15. Identify the type of the following compounds :

1. 📖 KOH
2. 📖 NaCl
3. 📖 MgO
4. 📖 H_2SO_4
5. CO_2
6. NH_4Cl
7. HBr
8. $Ca(OH)_2$
9. SO_3
10. $PbSO_4$
11. HNO_3
12. $PbBr_2$

16. Compare between :

1. 📖 Acids and bases [giving examples of each].
2. Carbonate group and bicarbonate group [according to : Chemical formula - Valency - Number of atoms].
3. Potassium sulphate and lead sulphate [according to : Chemical formula - Solubility in water].
4. Metal oxides and nonmetal oxides.

17. 📖 Once you collected an amount of rain water and another amount of sea water, and placed a litmus paper in each sample of water. You observed that its colour changed into red in case of rain water where it changed into blue in case of sea water. Explain.

18. Form the following formulae from [H , K , SO_4 , OH].

1. A chemical formula for an acid.
2. A chemical formula for a base.
3. A chemical formula for a salt.

19. Mention the valency of sulphur in the following compounds, and mention their type :

1. SO_3 2. SO_2 3. Na_2S 4. H_2S

20. If you have an element ($^{39}_{19}X$) :

1. Mention its kind. Why ?
2. Mention its valency (give a reason).
3. Write the chemical formula of its oxide.
4. Complete : It combines with sulphate group to give .... salt.

21. Two elements (X) and (Y), their atomic numbers are 11 and 17 respectively, answer the following questions :

1. Write the electronic distribution of each one.
2. What is the valency of each one? (give a reason).
3. What is the type of the compound produced due to their combination ?

22. If you have four elements ($_9X$, $_{13}Y$, $_7Z$, $_{20}Q$) :

1. Write the electronic distribution of each one, then conclude the type and the valency of each element.
2. What is the type of the compound produced from :

   a) Combination between element (X) and element (Y).

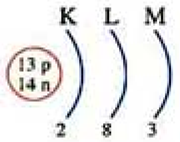
   b) Combination between element (Y) and oxygen ($_8O$), write the chemical formula.
3. What is the type of the combination resulted between element (X) and element (Q) ? Write the chemical formula of the produced compound.

23. Element (X) combines with oxygen forming (X_2O) oxide :

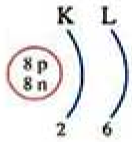
1. Mention the valency of this element.
2. What is the type of the produced oxide ?

24. Study the following figures, then answer the following questions :

1 Look at the following diagrams, then answer :



Element (A)



Element (B)

1. Write the name of element (A) and element (B).
2. Mention the valency of two elements (give a reason).
3. Write the name and the chemical formula for the compound, which is produced from the combination between element (A) and element (B).

2 Choose the suitable diagram for each of the following statements :

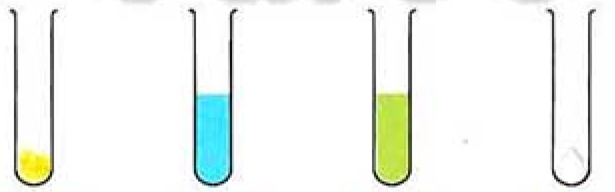
1. A divalent metallic element.
2. A divalent nonmetallic element.
3. A noble gas.
4. A monovalent nonmetallic element.
5. A monovalent metallic element.



(A) (B) (C) (D) (E)

3 If you have three tubes as in the figure, answer the following questions :

1. Write the chemical formula of each one.
2. Identify the type of each of them.
3. What is the effect of putting blue litmus paper on tubes (2) and (3) ?
4. What happens by adding water to tube (1) with shaking ?
5. What is the type of chemical bond in the compound of tube (4) ?



Calcium nitrate (1) | Sodium hydroxide (2) | Sulphuric acid (3) | Silver chloride (4)

Timss Questions

1. Choose the correct answer :

1. The atom of element .... changes into negative ion carries one negative charge during the chemical reaction.

   a. F b. Fe c. C d. Ag

2. The number of atoms equals the number of elements in the molecule of ....

   a. sodium hydroxide. b. water. c. calcium sulphate. d. sodium nitrate.

3. The atomic group that is formed of the same elements of water is ....

   a. carbonate. b. hydroxide. c. sulphate. d. nitrate.

4. When an element ($_{13}X$) combines with oxygen atom, the symbol of the produced oxide is ....

   a. XO b. X_2O_3 c. X_2O d. X_3O_2

5. Which of the following compounds contains the largest number of atoms ? ....

   a. Sodium hydroxide. b. Sulphuric acid. c. Aluminium sulphate. d. Carbon dioxide.

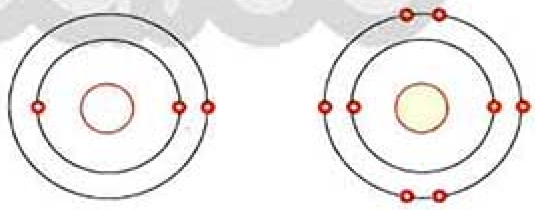
6. The number of electrons which exist in an ion of trivalent nonmetal element, the electrons of its atom revolve in 3 energy levels is ....

   a. 8 b. 10 c. 18 d. 20

7. From the opposite two figures, when element (X) combines with element (Y) produce ....

   a. XY b. XY_2

   c. X_6Y d. X_2Y



Atom of element (X) Atom of element (Y)

2. Complete the following statements :

1. The metallic element (X) that reacts with oxygen forming a compound, its formula is (XO) and has two energy levels, so its valency is .... and its atomic number equals ....

2. If the formula of oxide of element (M) is (MO), so the formula of its nitrate is .... and the formula of its phosphate is ....

3. A metallic element (X), its outermost energy level is M and its valency equals the number of energy levels of its ion and its mass number is doubled its atomic number. Find :

1. a. The atomic number.

   b. The mass number.

   c. The valency of the element.

2. Write the chemical formula for the compound molecule that is resulted from the combination of this element with oxygen.

4. A metallic element (X), whose electrons are distributed in three energy levels reacts with oxygen ($_8O$) forming a compound, whose formula is (XO). Answer the following questions :

1. Find the atomic number and the valency of element (X).
2. Mention the type of the ion of element (X) and the number of charges that it carries.
3. What is the type of chemical bond in the compound (XO) ?
4. **Choose :**

   (1) The ion of the element (X) combines with .... forming salt.

   a. Na^+ b. Ar c. $(NH_4)^+$ d. I^-

   (2) When the ion of element (X) combines with sulphate group, a compound is formed, its formula is ....

   a. $X(SO_4)_3$ b. $X_2(SO_4)_3$ c. XSO_4 d. X_2SO_4

5. A metallic element (X) combines with chlorine element forming a compound, whose formula is (XCl_3), if the number of energy levels in this element equals to the number of electrons in outermost energy level of its atom. Determine :

1. The atomic number and the valency of element (X).
2. The type of chemical bond in the compound (XCl_3).
3. The type of compound (XCl_3).
4. The chemical formula of hydroxide of element (X).

LESSON 3 Chemical Equation & Chemical Reaction

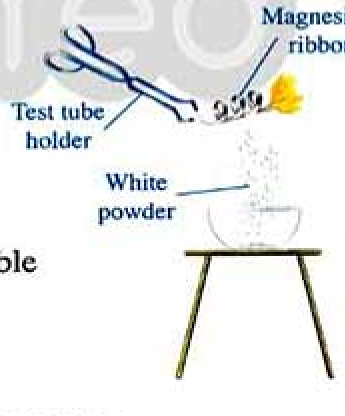


What is meant by the chemical reaction ?

You have known from the previous studies that the compound is a substance formed from the combination of atoms of different elements as a result of occurrence a chemical reaction between them.

To understand the concept of chemical reaction, we carry out the following activity.

Activity 1



Steps :

- Hold a piece of magnesium ribbon by a test tube holder.
- Burn the ribbon in air.

Observation :

The solid magnesium ribbon burns and changes from a bendable bright solid into a white powder of a new substance.

Conclusion :

Magnesium reacts with atmospheric oxygen (reactants) to form a new substance which is magnesium oxide (product).

$$\text{Magnesium} + \text{Oxygen} \xrightarrow{\Delta} \text{Magnesium oxide}$$

$$2Mg + O_2 \xrightarrow{\Delta} 2MgO \text{ (white powder)}$$

(Reactants) (Product)

➲ **The previous reaction, can be explained as follows :**

1. **Heat energy** has broken the double covalent bond in an oxygen molecule (O_2) to give two active oxygen atoms.



2. Each oxygen atom combines with a magnesium atom to form a molecule of magnesium oxide by an ionic bond.



NB

The mass of white powder which formed from burning of a magnesium ribbon is more than the mass of the ribbon before burning as a result of combination of oxygen with magnesium.

➲ **From the previous activity, we can define the chemical reaction as follows :**

Chemical reaction

It is the breaking of the existing bonds between the atoms of the molecules in the reactants and forming new bonds between the atoms of the molecules in the products.

Chemical equation

A chemical reaction can be represented by "Chemical equation"

Reactants (are substances that take part in the reaction) —Reaction conditions→ **Products** (are substances that are formed at the end of the reaction)

Chemical equation

It is a set of symbols and chemical formulae representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction as well.

UNIT 1

Life application 1 :

The word equation and symbolic equation expressing the reaction of magnesium with oxygen.

- Word equation : Magnesium + Oxygen $\xrightarrow{\Delta}$ Magnesium oxide
- Symbolic equation : $2Mg + O_2 \xrightarrow{\Delta} 2MgO$

★ The chemical equation must be **balanced** that means :
The number of atoms of each element in reactants must equal the number of atoms of the same element in products.

The balanced chemical equation

It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.

Life application 2 :

How to balance the symbolic equation that expresses the reaction of hydrogen gas with oxygen gas to form water : $H_2 + O_2 \longrightarrow H_2O$

- To balance the equation, it must be compared between the number of atoms of each element in reactants and the number of atoms of the same element in products.

When comparing the number of hydrogen atoms and oxygen atoms in reactants and products as follows :

	Reactants			Products
	H_2 +	O_2	→	H_2O



1

Number of atoms	H_2	O_2		H_2O
H	2		Balanced	2
O		2	Not balanced	1



We find that, the chemical equation is not balanced as the number of oxygen atoms in reactants is more than their number in products.

To balance the number of oxygen atoms, it must be multiplied $2 \times H_2O$ as follows :

2

Reactants			Products
H_2	+	O_2	$\longrightarrow$ $2H_2O$



Number of atoms	Reactants		Products
H	2	Not balanced	4
O	2	Balanced	2



We find that, the chemical equation is not balanced as the number of hydrogen atoms in reactants is less than their number in products.

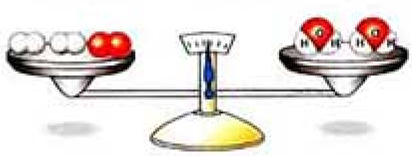
To balance the number of hydrogen atoms, it must be multiplied $2 \times H_2$ as follows :

3

Reactants			Products
$2H_2$	+	O_2	$\longrightarrow$ $2H_2O$



Number of atoms	Reactants		Products
H	4	Balanced	4
O	2	Balanced	2



The chemical equation becomes balanced as the number of atoms of each element in reactants equals the number of atoms of the same element in products.

Exercise 1 **Balance the following chemical equations :**

1. .... $Na + Cl_2 \longrightarrow$ .... $NaCl$
2. .... $H_2 +$ .... $NO \longrightarrow$ .... $H_2O + N_2$

Answer

1. 2 – 2 **2.** 2 – 2 – 2

UNIT 1

Laws of chemical combination

First : Law of conservation of matter (mass).
Second : Law of constant ratios.

First Law of conservation of matter (mass)

- Law of conservation of matter states that the matter is neither created nor destroyed, but it can be changed from one form to another.
- By applying the law of conservation of matter on chemical reactions, we can define it as follows :

Law of conservation of matter (mass)

The sum of reactants masses in any chemical reaction equals the sum of products masses.



The mass of reactants = The mass of products

Life application 3 :

Achieving the law of conservation of matter in the reaction of magnesium with oxygen. [The atomic masses of : Mg = 24 & O = 16].

2 Mg	+	O_2	$\xrightarrow{\Delta}$	2 MgO
(2 × 24) 48		(2 × 16) 32		2 (24 + 16) 2 × 40
80 gm				80 gm

- The sum of reactants masses = (2 × 24) + (2 × 16) = 48 + 32 = 80 gm.
- The sum of products masses = 2 (24 + 16) = 2 × 40 = 80 gm.

i.e.

The sum of reactants masses = The sum of products masses.
Which achieves the law of conservation of matter.

GR.

A chemical equation should be balanced.
To achieve the law of conservation of matter.

Examples :

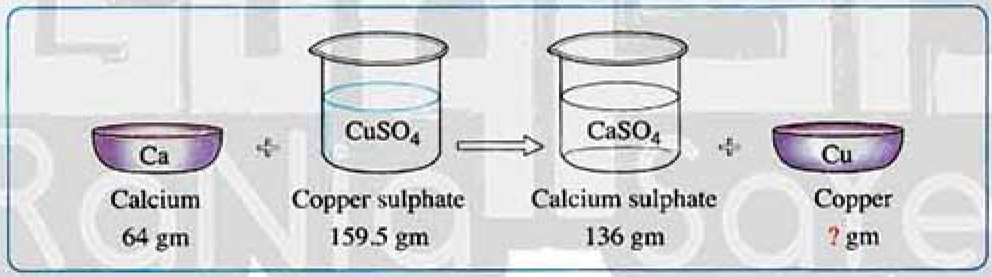
Ex. 1 Hydrogen gas reacts with chlorine gas forming hydrogen chloride. ***Express this reaction with a balanced symbolic equation and word equation with achieving the law of conservation of matter.***
[knowing that the atomic masses of : H = 1 & Cl = 35.5].

Solution

- Word equation : Hydrogen + Chlorine $\longrightarrow$ Hydrogen chloride
- Symbolic equation : $\mathbf{H_2 + Cl_2 \longrightarrow 2HCl}$
  $(2 \times 1)\ (2 \times 35.5) \qquad 2\ (1 + 35.5)$
- The sum of reactants masses = $(2 \times 1) + (2 \times 35.5) = 2 + 71 = 73$ gm.
- The sum of products masses = $2\ (1 + 35.5) = 2 \times 36.5 = 73$ gm.

∴ The sum of reactants masses equals the sum of products masses.
Which achieves the law of conservation of matter.

Ex. 2 **What is the mass of copper (Cu) resulted from the following reaction ?**



Solution

$$\mathbf{Ca + CuSO_4 \longrightarrow CaSO_4 + Cu}$$

According to the law of conservation of matter :

- The mass of calcium + The mass of copper sulphate
  = The mass of calcium sulphate + The mass of copper.
- The mass of copper = (The mass of calcium + The mass of copper sulphate)
  – The mass of calcium sulphate.
- The mass of copper = (64 + 159.5) – 136
  = 223.5 – 136
  = 87.5 gm.

Ex. 3 Achieve from the following balanced equation by applying the law of conservation of matter on it : $NaNO_3 \xrightarrow{\Delta} NaNO_2 + O_2$

[knowing that the atomic masses of : Na = 23 , N = 14 & O = 16].

Solution

$$NaNO_3 \xrightarrow{\Delta} NaNO_2 + O_2$$

$$[23 + 14 + (3 \times 16)] \quad [23 + 14 + (2 \times 16)] \quad (2 \times 16)$$

- The sum of reactants masses = 23 + 14 + (3 × 16) = 37 + 48 = 85 gm.
- The sum of products masses = [23 + 14 + (2 × 16)] + (2 × 16) = 37 + 32 + 32 = 101 gm.

∵ The sum of reactants masses doesn't equal the sum of products masses.

∴ The equation is not balanced because the law of conservation of matter is not achieved.

Second Law of constant ratios

The chemical compound is produced from a chemical combination of atoms of two elements or more by constant weight ratios.

Example :

During the reaction between magnesium and oxygen to form magnesium oxide several times by different weight masses, we notice the following results.

Reactants masses				Product mass	Ratio between magnesium : oxygen
$2Mg$	+	O_2	→	$2MgO$	
48 gm Magnesium	+	32 gm Oxygen	→	80 gm Magnesium oxide	48 gm : 32 gm 3 : 2
24 gm Magnesium	+	16 gm Oxygen	→	40 gm Magnesium oxide	24 gm : 16 gm 3 : 2

➲ **From the previous example, we conclude that :**

Magnesium oxide compound is always formed from combination between magnesium and oxygen elements respectively by constant weight ratio (3:2) however the masses of the elements involved in the reaction changed, according to the law of constant ratios.

Law of constant ratios

The chemical compound is formed from combination of its elements by constant weight ratios.

NB

If the ratio between the masses of elements that enter the chemical reaction differs from the fixed ratio which these elements react with to form a certain compound so, the increase in the mass of each of them remains without reaction.

Life application 4 :

Reaction of lead with sulphur according to the law of constant ratios.

- 3 gm of sulphur combines completely with 15 gm of lead to form 18 gm of lead sulphide.



- On adding 6 gm of sulphur to 15 gm of lead, 3 gm only of sulphur combines with 15 gm of lead forming 18 gm of lead sulphide and 3 gm of sulphur remains without reaction.



- On adding 3 gm of sulphur to 20 gm of lead, 3 gm of sulphur combines with 15 gm only of lead forming 18 gm of lead sulphide and 5 gm of lead remains without reaction.



TRY TO ANSWER worksheet **6** in the Notebook

UNIT 1

Types of chemical reactions

There are many types of chemical reactions. We will study one of them, which is direct combination reactions :

Direct combination reactions

Direct combination reactions

They are the reactions which involve a combination of two or more substances to form a new compound.



$$A + B \xrightarrow{\Delta} AB$$

➲ **The following diagram shows the types of direct combination reactions :**

Types of direct combination reactions

1. Combination of an element with another element
   - (A) Combination of two nonmetals
   - (B) Combination of a metal with a nonmetal
2. Combination of an element with a compound
3. Combination of a compound with another compound

1 Combination of an element with another element :

A Combination of two nonmetals

Ex. 1 Carbon which is a nonmetal joins oxygen which is a nonmetal to form carbon dioxide gas.

Carbon	+	*Oxygen*	$\xrightarrow{\Delta}$	*Carbon dioxide*
C	+	O_2	$\xrightarrow{\Delta}$	CO_2
(Nonmetal)		(Nonmetal)		

Ex. 2

Hydrogen	+	*Chlorine*	$\longrightarrow$	*Hydrogen chloride*
H_2	+	Cl_2	$\longrightarrow$	$2HCl$
(Nonmetal)		(Nonmetal)		

B Combination of a metal with a nonmetal

Ex. Magnesium which is a metal joins oxygen which is a nonmetal to form magnesium oxide.

Magnesium	+	*Oxygen*	$\xrightarrow{\Delta}$	*Magnesium oxide*
$2Mg$	+	O_2	$\xrightarrow{\Delta}$	$2MgO$
(Metal)		(Nonmetal)		

2 Combination of an element with a compound :

Ex. 1 Oxygen (element) reacts with carbon monoxide (compound) producing carbon dioxide.

$$\text{Carbon monoxide} + \text{Oxygen} \xrightarrow{\Delta} \text{Carbon dioxide}$$
$$\underset{\text{(Compound)}}{2CO} + \underset{\text{(Element)}}{O_2} \xrightarrow{\Delta} \underset{\text{(Compound)}}{2CO_2}$$

Ex. 2

$$\text{Nitrogen monoxide} + \text{Oxygen} \longrightarrow \text{Nitrogen dioxide}$$
$$\underset{\text{(Compound)}}{2NO} + \underset{\text{(Element)}}{O_2} \longrightarrow \underset{\text{(Compound)}}{2NO_2}$$

3 Combination of a compound with another compound :

Example : Combination of ammonia gas (compound) and hydrochloric acid (compound).

Activity 2

Step :
Place a glass rod wet with conc. hydrochloric acid (HCl) close to the mouth of a test tube containing ammonia solution.



Observation :
White clouds of ammonium chloride (NH_4Cl) are formed.

Conclusion :
Ammonia gas (NH_3) [evolves from ammonia solution] combines with hydrochloric acid (HCl) to give ammonium chloride (NH_4Cl) (white clouds).

$$\text{Ammonia} + \text{Hydrochloric acid} \xrightarrow{\text{Conc.}} \text{Ammonium chloride}$$
$$\underset{\text{(Compound)}}{NH_3} + \underset{\text{(Compound)}}{HCl} \xrightarrow{\text{Conc.}} \underset{\text{(Compound)}}{NH_4Cl} \text{ (white clouds)}$$

Exercise 2

Determine the types of the following direct combination reactions.

1. $2NO + O_2 \longrightarrow 2NO_2$
2. $H_2 + Cl_2 \longrightarrow 2HCl$
3. $NH_3 + HNO_3 \longrightarrow NH_4NO_3$

UNIT 1

Answer

1. Reaction between an element and a compound.
2. Reaction between an element and another element.
3. Reaction between a compound and another compound.

Chemical reactions in our life

Some chemical reactions play an essential role in our life , while others have negative impacts (effects) on both human beings and environment.

1 Importance of chemical reactions

➲ Chemical reactions play an important role in our life GR. **because through which it is possible to :**

A Obtain electric and heat energies used in some industries.

B Obtain more useful substances from less used substances.

C Prepare thousands of compounds are commonly used in many industries such as :

1 Manufacture of medicines



2 Manufacture of fertilizers



3 Manufacture of fuel



4 Manufacture of plastics



5 Food industries



6 Manufacture of car batteries



2 Negative effects of chemical reactions

➲ From negative effects of chemical reactions is the **environmental pollution** resulting from the emission of some harmful gases from these chemical reactions.

➲ The burning reaction is considered from the reactions that produce a lot of pollutant gases **such as :**



A Burning of coal and cellulose fibres :

Such as burning paper and cigarettes cause air pollution and lung cancer.

B Fuel burning :

It is an example of environmental pollution due to the presence of harmful gases.

➲ **The following diagram shows the products of fuel burning.**

Products (results) of fuel burning

- **1 Carbon oxides**
  - A: Carbon monoxide (CO)
  - B: Carbon dioxide (CO_2)
- **2 Sulphur oxides**
  - A: Sulphur dioxide (SO_2)
  - B: Sulphur trioxide (SO_3)
- **3 Nitrogen oxides**

1 Carbon oxides

A) Carbon monoxide (CO)



Carbon monoxide (CO) has a dangerous impact on the human being GR **as it causes :**

- **Headache.**
- **Fainting.**
- **Severe stomach-aches and may lead to death.**

B) Carbon dioxide (CO_2)



– Increasing the ratio of carbon dioxide in atmospheric air leads to increase in the air temperature causing a phenomenon known as a greenhouse effect, where :

- The sun rays penetrate the Earth's atmosphere.
- The Earth absorbs these rays, then reemits the radiation back in the form of thermal radiation.
- Carbon dioxide prevents the penetration of these thermal radiations to the outer space causing the increase of the air temperature which is known as "greenhouse phenomenon".

UNIT 1

2 Sulphur oxides

- Sulphur oxides are resulted from fuel burning such as :



(A) Sulphur dioxide (SO_2)

(B) Sulphur trioxide (SO_3)

- **Their harms :** They are acidic gases that cause :
  - Respiratory system malfunction (breathing problems).
  - Building corrosion.

3 Nitrogen oxides



- Nitrogen oxides are resulted from fuel burning during the time of lightning.
- **Their harms :** They are poisonous acidic gases that affect the nervous system and the eye.

TRY TO ANSWER worksheet 7
- General Exercise of the School Book on Unit 1
- Model Exams on Unit 1

in the Notebook



- **Chemical reaction :**
  It is the breaking of the existing bonds between the atoms of molecules in the reactants and forming new bonds between the atoms of the molecules in the products.
- **Chemical equation :**
  It is a set of symbols and chemcial formulae representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction as well.
- **The balanced chemical equation :**
  It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.
- **Law of conservation of matter (mass) :**
  The sum of reactants masses in any chemical reaction equals the sum of products masses.
- **Law of constant ratios :**
  The chemical compound is formed from the combination of its elements by constant weight ratios.
- **Direct combination reactions :**
  They are the reactions which involve a combination of two or more substances to form a new compound.

  (A) An element with another element :

  $$C + O_2 \xrightarrow{\Delta} CO_2$$

  (B) An element with a compound :

  $$2CO + O_2 \xrightarrow{\Delta} 2CO_2$$

  (C) A compound with another compound :

  $$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$$

Negative effects of chemical reactions

1. Burning of coal and cellulose fibres
2. Fuel burning

Products of fuel burning

1. Carbon oxides
   - a. Carbon monoxide (CO)
   - b. Carbon dioxide (CO_2)
2. Sulphur oxides
   - a. Sulphur dioxide (SO_2)
   - b. Sulphur trioxide (SO_3)
3. Nitrogen oxides

Questions on lesson three

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. The chemical reaction causes ....
   a. breaking the bonds between the products and forming new bonds between the reactants.
   b. the formation of bonds between the products ,then breaking the bonds between the reactants.
   c. breaking the bonds between the molecules of reactants and forming new bonds between the molecules of the products.
   d. breaking the bonds between the products and the reactants.
2. The bright magnesium ribbon changes into a white powder of .... when it burns in air.
   a. magnesium nitrite b. magnesium oxide
   c. magnesium hydroxide d. magnesium dioxide
3. The sum of reactants masses in any chemical reaction is .... the sum of products masses.
   a. doubled b. more than c. equal to d. less than
4. On applying the law of constant ratios on the following reaction :

   $$2Mg + O_2 \longrightarrow 2MgO$$

   We will find .... *[knowing that : Mg = 24 and O = 16].*
   a. each 48 g (Mg) combines with 32 g (O) to form 80 g (MgO).
   b. each 24 g (Mg) combines with 16 g (O) to form 40 g (MgO).
   c. each 12 g (Mg) combines with 8 g (O) to form 20 g (MgO).
   d. (a) , (b) and (c) are correct answers.
5. If the molecule of carbon dioxide consists of one atom of carbon and two atoms of oxygen, knowing that the mass of carbon is 12 and that of oxygen is 16, so the mass of two molecules of carbon dioxide equals .... gm.
   a. 22 b. 44 c. 88 d. 33
6. Which of the following is considered a balanced chemical equation ? ....
   a. $Mg + O_2 \longrightarrow MgO$ b. $2Mg + O_2 \longrightarrow MgO$
   c. $Mg + O_2 \longrightarrow 2MgO$ d. $2Mg + O_2 \longrightarrow 2MgO$
7. Direct combination reaction takes place between ....
   a. two nonmetals. b. a metal and a nonmetal.
   c. a compound with another. d. all of the previous answers.

8. Ammonia combines with conc. HCl producing .... of ammonium chloride.
   a. white ppt.   b. brown clouds   c. white clouds   d. brown ppt.

9. The .... equation verifies the law of conservation of matter.
   a. $N_2 + H_2 \longrightarrow NH_3$ b. $NO + O_2 \longrightarrow NO_2$
   c. $KCl + AgNO_3 \longrightarrow AgCl + KNO_3$ d. $H_2O \longrightarrow H_2 + O_2$

10. Chemical reactions are used in ....
   a. medicines industry.   b. fertilizers industry.
   c. food industry.   d. all of the previous answers.

11. Increasing the ratio of .... gas in the atmosphere leads to increasing the air temperature.
   a. carbon monoxide   b. carbon dioxide   c. nitric oxide   d. sulphur dioxide

12. The gases that cause building corrosion are ....
   a. nitrogen oxides.   b. carbon oxides.   c. sulphur oxides.   d. both (b) and (c).

13. The gases that affect the nervous system and the eye are ....
   a. nitrogen oxides.   b. carbon oxides.   c. sulphur oxides.   d. (a) and (b).

14. All of these gases are acidic gases except ....
   a. sulphur dioxide.   b. sulphur trioxide.   c. nitrogen oxides.   d. ammonia.

15. .... oxides are resulted during the time of lightning.
   a. Carbon   b. Sulphur   c. Nitrogen   d. (a) and (b)

16. The substances resulted from burning of coal and cellulose fibres cause ....
   a. headache.   b. fainting.
   c. lung cancer.   d. (a) , (b) and (c) are correct.

2. Choose from column (B) what suits it in column (A) :

1.

(A) Type of reaction	(B) Symbolic equation
1. Combination of a metal with a nonmetal.	a- $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
2. Combination of an element with a compound.	b- $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
3. Combination of a compound with another compound.	c- $C + O_2 \xrightarrow{\Delta} CO_2$
4. Combination of a nonmetal with a nonmetal.	d- $2CO + O_2 \xrightarrow{\Delta} 2CO_2$

2.

(A) Pollutant	(B) Harms
1. Carbon dioxide	a- Building corrosion.
2. Sulphur oxides	b- Nervous system irritation.
3. Nitrogen oxides	c- Occurrence of headache and fainting.
4. Carbon monoxide	d- Increasing of air temperature.

3. Put (✓) in front of the right statement and (×) in front of the wrong one, then correct it :

1. On burning a magnesium strip in the air, a black powder is formed. ( )
2. Balancing chemical equation means that the number of atoms of each element is the same in both reactants and products. ( )
3. The mass of a molecule of (NO_2) is more than the mass of a molecule of (NO). ( )
4. The reaction of magnesium and oxygen is considered a direct combination reaction between two nonmetal elements. ( )
5. When ammonia gas reacts with hydrochloric acid, white clouds of ammonium chloride are formed. ( )
6. It is possible to convert the chemical energy in some chemical reactions to heat energy or electric energy. ( )
7. Sulphur dioxide gas acts as a greenhouse effect. ( )
8. By increasing the ratio of (CO_2), the air temperature decreases. ( )
9. Carbon oxides have bad effects on the nervous system and the eye. ( )
10. Sulphur oxides and nitrogen oxides are acidic gases. ( )
11. Burning of cigarettes causes lung cancer. ( )
12. The burning reactions are considered from the chemical reactions that pollute the environment. ( )
13. Nitrogen oxides are formed during occurrence of earthquakes. ( )

4. Write the scientific term of each of the following :

1. 📖 Breaking the bonds between the molecules of the reactants and forming new bonds between the molecules of the products.
2. 📖 A set of chemical formulae and symbols expressing the reactants, the products and the reaction conditions.
3. The sum of reactants masses in any chemical reaction equals the sum of products masses.
4. The chemical compound that is formed from combination of its elements by constant weight ratios.
5. Reactions which involve combination between an element with another or a compound with another.

6. White clouds are formed on placing a glass rod wet with conc. hydrochloric acid close to the mouth of a test tube containing ammonia solution.
7. The gas which acts as a greenhouse effect.
8. Oxides that cause building corrosion.
9. Poisonous gases that affect both the eye and the nervous system.

5. Complete the following statements :

1. The chemical reaction is the .... of the existing bonds between the atoms of the molecules in the reactants and .... new bonds between the atoms of the molecules in the products.
2. In the reaction : $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
   a. The .... bond in an oxygen molecule is broken to give ....
   b. The magnesium atom combines with .... atom to form .... molecule.
3. The chemical equation is a set of .... and .... expressing the reactants and .... molecules in the chemical reaction.
4. The chemical equation should be .... to achieve the law of ....
5. If 48 gm of magnesium combines with 32 gm of oxygen, they produce .... gm of ....
6. A compound is produced from a chemical combination of atoms of two elements or more by constant weight proportions and this is known as the law of ....
7. Combination of carbon with oxygen gives .... gas and this reaction is considered .... reaction.
8. When a glass rod wet with conc. hydrochloric acid is put at the mouth of a test tube containing ammonia solution, ... clouds of .... are formed.
9. Chemical reactions are used in many industries such as manufacture of .... , ... and ....
10. .... , ... and .... are among products of fuel burning.
11. Increasing the ratio of .... gas in air leads to increasing the air temperature.
12. Carbon monoxide is a dangerous gas which causes .... , ... and ....
13. Sulphur oxides such as .... and .... are acidic gases which cause building ....
14. The combination of oxygen gas with .... compound produce .... gas which is responsible for greenhouse phenomenon.
15. Burning of coal and cellulose fibers cause .... pollution and ....
16. .... oxides affect the nervous system, while .... oxides cause respiratory system malfunction.
17. .... oxides resulted during the time of lightning and they are from poisonous .... gases.

6. Complete the following equations and mention the type of each reaction :

1. $2Mg + O_2 \xrightarrow{\Delta}$ .... (..........)
2. $C + O_2 \xrightarrow{\Delta}$ .... (..........)
3. $NH_3 + HCl \xrightarrow{Conc.}$ .... (..........)
4. $2CO + O_2 \xrightarrow{\Delta}$ .... (..........)
5. $2NO + O_2 \longrightarrow$ .... (..........)

7. Give reasons for :

1. A white powder is formed when a magnesium ribbon is burned in air.
2. 📖 A chemical equation should be balanced.
3. The mass of magnesium is increased when it is burned.
4. 📖 White clouds are formed when ammonia gas reacts with conc. hydrochloric acid.
5. Chemical reactions play an important role in our life.
6. The use of chemical reactions is considered a double-edged weapon.
7. Burning of fuel is among the reactions that pollute the environment.
8. (CO_2) gas acts as a greenhouse effect.
9. Smoking is very harmful to health.
10. The spread of cancer tumors increases in the country that use coal as fuel.
11. Burning of coal and cellulose fibers has bad effect.
12. Carbon monoxide is a dangerous gas.
13. Sulphur oxides cause respiratory system malfunction and building corrosion.
14. Nitrogen oxides affect the nervous system and the eye.

8. Rewrite the following chemical equations after balancing them :

1. $Al + Cl_2 \longrightarrow AlCl_3$
2. $H_2 + NO \longrightarrow H_2O + N_2$
3. $Na + Cl_2 \longrightarrow NaCl$
4. $KI + Cl_2 \longrightarrow 2KCl + I_2$
5. $CO + O_2 \longrightarrow CO_2$

9. What is meant by each of the following ... ?

1. 📖 Chemical reaction.
2. 📖 Chemical equation.
3. The balanced chemical equation.
4. Law of conservation of matter (mass).
5. Law of constant ratios.
6. Direct combination reactions.

10. Mention the name of the chemical pollutants that cause the following harms :

1. Lung cancer.
2. Headache, fainting and severe stomach-aches.
3. Respiratory system malfunction and building corrosion.
4. Nervous system irritation and inflammation of the eye.

11. Write the chemical equation representing the following reactions, then indicate the type of each reaction :

1. Heating a magnesium ribbon in air.
2. Burning of carbon in the presence of oxygen.
3. Reaction of ammonia gas with hydrochloric acid.
4. Reaction of carbon monoxide with oxygen.

12. What happens in each of the following : [explain your answer with balanced symbolic chemical equations if it is possible] :

1. Burning a magnesium ribbon in air.
2. Approaching a wet rod with hydrochloric acid to ammonia gas.
3. Burning of a piece of coal in air.
4. The ratio of (CO_2) gas increases in air.
5. Burning of coal and cellulose fibers.

13. Mention the harms of :

1. Carbon monoxide.
2. Carbon dioxide.
3. Sulphur oxides.
4. Nitrogen oxides.

14. Indicate using symbolic and word equations, an example to the following :

1. Direct combination between an element with an element.
2. Direct combination between an element with a compound.
3. Direct combination between a compound with another compound.

15. Variant questions :

(1) Write a short paragraph on :

Burning of fuel and its harmful effects on human beings and environment.

(2) Knowing that the mass of carbon (C) is 12 and oxygen (O) is 16 :

Find the total mass of reactants and products through the following reaction :

$$C + O_2 \xrightarrow{\Delta} CO_2$$

(3) Calculate the masses of reactants and products in the following reactions :

(1) $HCl + NaOH \longrightarrow NaCl + H_2O$

(2) $S + O_2 \longrightarrow SO_2$

(Knowing that the mass of : H = 1 & O = 16 & S = 32 & Cl = 35.5 and Na = 23).

(4) From the opposite reaction : $C + O_2 \xrightarrow{\Delta} CO_2$

(1) Show how the conservation law of matter is achieved, then define it ?
[knowing that the atomic masses of : C = 12 & O = 16].

(2) What is the effect of the produced gas on the environment ?

(3) **What is the type of each of the following ?**

a. The produced oxide.

b. The chemical bond in the produced molecule.

c. The chemical reaction that is occurred.

(5) If you have the following substances :

- Conc. hydrochloric acid. - Magnesium ribbon.
- A piece of coal. - Ammonia. - Flame.

Show by balanced chemical equations only how to obtain :

(1) Metal oxide. (2) Nonmetal oxide. (3) White clouds.

(6) One of your classmates has asked you to share him writing a report on the role of technology in chemical reactions, indicating their importance and their bad effects on the environment. What is the information you will support him with ?

(7) What is the mass of calcium nitrate produced from the reaction of 74 gm of calcium hydroxide with 126 gm of nitric acid ? Knowing that the mass of the formed water is 36 gm according to this equation :
Calcium hydroxide + Nitric acid ⟶ Calcium nitrate + Water

16. Study the following figures, then answer the following questions :

(1) From the opposite two figures, mention :

a. The type of the reaction that represents each figure [write the equation].

b. The type of the produced compound from the two reactions (1) and (2).

c. The properties of magnesium ribbon and the piece of coal [two only].

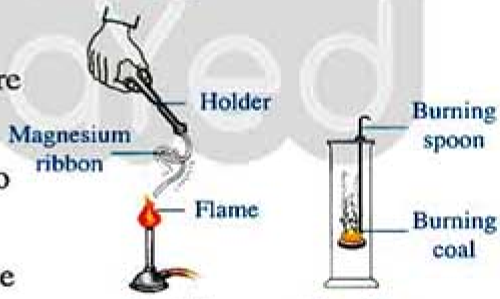


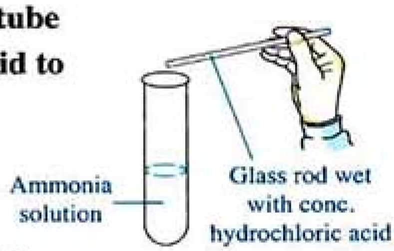
Fig. (1) Fig. (2)

(2) If you put a small amount of ammonia solution in a test tube and approach a glass rod wet with conc. hydrochloric acid to the mouth of the test tube as in the figure :

a. What do you observe ?

b. Mention the type of the reaction [write the equation].

c. What is the name and the type of the produced compound ?



Timss Questions



1. Choose the correct answer :

1. To form 54 gm of water, it is required to react 48 gm of oxygen with 6 gm of hydrogen, so 2 gm of hydrogen combines completely with .... gm of oxygen.

   a. 12 b. 16 c. 96 d. 144

2. The ratio between the mass of reactants in the chemical reaction to the mass of products is .... one according to the law of conservation of matter.

   a. less than b. more than c. equal to d. no correct answer

3. On burning a magnesium ribbon in air, the weight of the formed white powder is .... the weight of magnesium ribbon.

   a. more than b. less than c. equal to d. no correct answer

2. Give reasons for :

1. Erosion the front of houses in the industrial areas.
2. Country prevents the passage of cars in the archaeological areas.

3. In the opposite reaction : $2Mg + O_2 \xrightarrow{\Delta} 2MgO$

48 gm of magnesium reacts with 32 gm of oxygen to form 80 gm of magnesium oxide.

How many grams of magnesium is required to form 10 gm of magnesium oxide ?

4. Study the following reaction, then answer the following questions :

$$NaOH + HCl \longrightarrow NaCl + H_2O$$

[knowing that the mass of : Na = 23 , O = 16 , H = 1 , Cl = 35.5].

(1) Choose : The resulting salt from the reaction .... in water.

a. soluble b. insoluble c. precipitates

(2) Calculate the mass of sodium chloride resulted from the reaction of 80 gm of sodium hydroxide with a suitable amount of hydrochloric acid.

UNIT 2

Force and Motion



Lessons of the unit :

1. Fundamental Forces in Nature.
2. Accompanied Forces to Motion.
3. Motion.

Unit Objectives :

By the end of this unit, students will be able to :

- Identify the concept of force.
- Classify fundamental forces in nature into gravitational, electromagnetic, strong and weak nuclear forces.
- Infer the effective factors on the gravitational force between two objects.
- Form an electric circuit to make an electromagnet.
- Name the forces which affect an object and those resulted from an object mass effect.
- Interpret the static and moving objects.
- Give life examples of forces that affect living systems.
- Describe the periodic motion.
- Identify wave motion.



- Apply logic interpretations of the results of wave motion experiments.
- Give examples of technological applications in wave motion domain.
- Cooperate with his (her) classmates to carry out experiments and deduce concepts.
- Apply the scientific thinking skills to understand and interpret motion phenomena.
- Identify the relative motion to an object relative to another one or a fixed benchmark (frame of reference).
- Realize greatness of God in ordering the forces controlling the universal phenomena.
- Appreciate scientists' role in interpreting force and motion.

LESSON 1

Fundamental Forces in Nature



What is the meaning of force ?

To know the meaning of the force, let's see the following examples :

Examples	Figures	Reason
1. The book on the table remains static as long as no one moves it GR.		***Because there is no force acting on it.***
2. The wall doesn't move when you push it with your hands GR.		***Because the force acting on the object is improper.***
3. The static ball moves when you kick it with your foot and stops when the goalkeeper catches it GR.		***Because the object's state changes from static state to motion state or vice versa when a proper force acts on it.***

4. The ball changes its direction when the player delivers it with his head GR.		*Because the direction of the acting force is in the opposite direction of the movement of the object.*

➲ **From the previous examples,** we can define the force as follows :

Force

It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.

NB

The measuring unit of force is **newton (N)**.

What happens when a proper force acts on ?

A. A static object.

The object will move from its position to another position in the same direction of the force acting on it.

B. A moving object in the same direction of its movement.

The speed of the moving object will increase.

Fundamental forces in nature

There are many different types of forces, these forces cannot be seen in nature but we can feel them in some phenomena, such as :

1. Lightning and thunder.
2. Wind motion.
3. The gravitational of objects to Earth.
4. The attraction of iron to magnet.

Also, there are forces causing technological applications, such as :

1. Generating the electric current.
2. Fire weapons.
3. Nuclear explosions.
4. Nuclear reactors.

UNIT 2

➲ **Although the forces differ, the scientists classified them into three divisions. The following diagram shows them :**

Fundamental forces in nature
- Gravitational forces.
- Electromagnetic forces.
- Nuclear forces.
  - A Weak nuclear forces
  - B Strong nuclear forces

First Gravitational forces



- Isaac Newton was the first one who discovered the Earth's gravitational force when he was standing under a tree and he found an apple falling down to the ground.
- **Then he proved that**, all masses are attracted toward the Earth itself by a force known as "Earth's gravitational force" and this force depends on the masses of the objects, **as shown in the following activity.**

Activity 1 Earth attracts objects.



Steps :
- Put on the ground a set of objects that differ in mass (1 kg - 5 kg - 10 kg).
- Try to lift the masses and put them on a table beginning with the smallest mass then the next one in order.

Observation :
The exerted work to lift objects increases by increasing the object's mass.

Conclusion :
As the object's mass increases, the work done to lift the object upwards increases in the opposite direction of the Earth's gravitational.

Interpretation :
- Earth attracts the objects to its centre by a force called **"Object's weight"**.
- Object's weight increases by increasing the object's mass and vice versa.

Object's weight

It is the ability of the Earth to attract that object to its centre.
or
It is the force of Earth's gravitational to the object.

NB
The measuring unit of the object's weight is **newton (N)**.

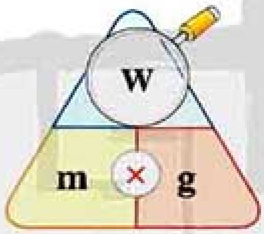
So, the weight of an object can be calculated by using the following relation :

Object's weight (W) «newton» = **Object's mass (m)** «Kg» × **Earth's gravitational acceleration (g)** «m/sec²»

The Earth's gravitational acceleration = $9.8 \simeq 10$ m/sec^2.

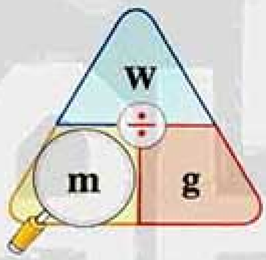
To calculate the weight, mass and gravitational acceleration :

Weight



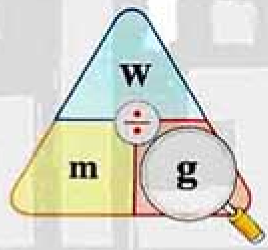
$W = m \times g$

Mass



$m = \frac{W}{g}$

Gravitational acceleration



$g = \frac{W}{m}$

➲ **From the previous relation,** **we can conclude that the object's weight depends on :**

1. Object's mass.
2. Gravitational acceleration.

What is meant by ? **The weight of an object equals 30 newton.**

➲ This means that the ability of the Earth to attract this object equals 30 newton.

Note

The effective point of an object's weight is located at its centre and this is known as **centre of gravity**, so it is said that the Earth attracts the objects towards its centre (its centre of gravity).



Centre of gravity of a spherical body

UNIT 2

Problems

1 ***Find the weight of an object of 100 kg mass [knowing that the Earth's gravitational acceleration is 9.8 m/sec^2].***

Solution

Object's weight = Mass × Earth's gravitational acceleration

= 100 × 9.8 = 980 N.

2 ***Calculate the mass of an object if its weight is 280 newton [knowing that the Earth's gravitational acceleration is 10 m/sec^2].***

Solution

Object's weight = Mass × Earth's gravitational acceleration

$$\text{Mass} = \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}} = \frac{280}{10} = 28 \text{ kg.}$$

3 ***A big box has a number of small balls that are similar in mass.***

If you know that :

- The mass of one ball = 0.5 kg.
- The weight of balls = 500 N.
- The Earth's gravitational acceleration = 10 m/sec^2.

Calculate the number of small balls inside the box.

Solution

The weight of one ball = The mass of one ball × Earth's gravitational acceleration

= 0.5 × 10 = 5 N.

$$\text{Number of balls} = \frac{\text{Weight of balls}}{\text{Weight of one ball}} = \frac{500}{5} = 100 \text{ ball.}$$

GR.

- ***The mass of the object remains constant by changing its position on the Earth's surface.***
  Because the mass of the object is the amount of matter that the object contains, and it doesn't change by changing the position.
- ***Object's weight changes from one place to another on the Earth's surface.***
  Because Earth's gravitational acceleration changes from one place to another.
- ***The weight of the object is always more than its mass.***
  Because it equals multiplying the mass of the object by Earth's gravitational acceleration.

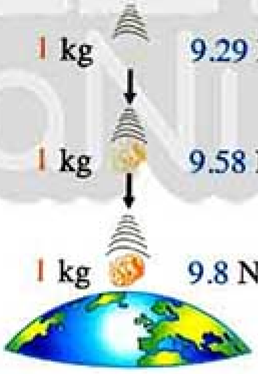
Note

The value of Earth's gravitational acceleration changes according to :

1 Approach or move away from the centre of the Earth

- **Earth's gravitational acceleration :**
  - Decreases by moving away from the Earth's centre. (on raising up the surface of the Earth).
  - Increases by approaching to the Earth's centre. (on getting down towards the surface of the Earth).

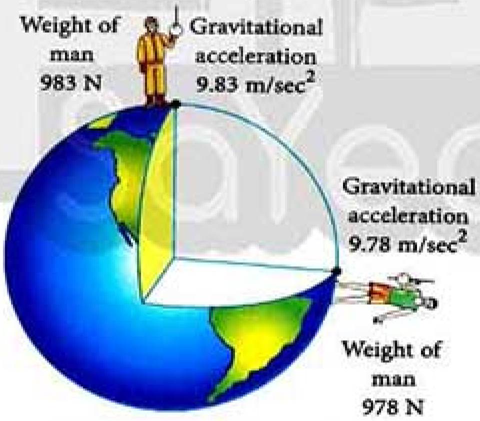
Height	Mass	Weight
200 km	1 kg	9.29 N
100 km	1 kg	9.58 N
Zero	1 kg	9.8 N



The body weight changes according to its distance to the centre of the Earth.

2 Transfer from one place to another on the Earth's surface

- Due to the difference of the distance between the Earth's surface and its centre from one place to another due to the non-spherical shape of the Earth, so the distance between the centre of the Earth and any point on Earth's surface at the **two poles** [north and south poles] is **less than** the distance between the centre of the Earth and any point on the Earth's surface at the **equator**.
- So, the Earth's gravitational acceleration at the **two poles** is **more than** that at the **equator**.



The weight of the man, its mass 100 kg at the north pole is **more than** its weight at the equator.

GR.

The weight of the object at the south pole is greater than its weight at the equator.

Because the Earth's gravitational acceleration at the south pole is greater than the Earth's gravitational acceleration at the equator.

UNIT 2

Problems

1 If the mass of an object at the equator equals 50 kg. What is its mass at the two poles ? Explain.

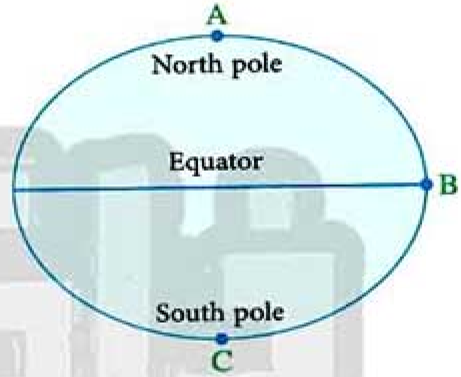
Solution

The mass of the object at the two poles = 50 kg.

Because the mass of the object doesn't change from a place to another on the Earth's surface.

2 In the opposite figure :
If the mass of an object at point (A) is 20 kg.

1. Calculate the weight of the object at :
   a. point (A).
   b. point (B).
   (knowing that the Earth's gravitational acceleration at the south pole = 9.83 m/sec^2 and at the equator = 9.78 m/sec^2)
2. What is the change that happened to the weight when the object transfers from point (B) to point (C) ?



Solution

1. Object's weight = Mass × Earth's gravitational acceleration
   a. Earth's gravitational acceleration at the south pole = Earth's gravitational acceleration at the north pole = 9.83 m/sec^2.
   The weight at point (A) [north pole] = 20 × 9.83 = 196.6 N.
   b. The weight at point (B) [equator] = 20 × 9.78 = 195.6 N.
2. The weight of the object increases, because the value of Earth's gravitational acceleration at point (C) [south pole] is more than its value at point (B) [equator].

TRY TO ANSWER worksheet 8 in the Notebook

Second Electromagnetic forces

They are the magnetic forces (magnetism) produced by the effect of passing an electric current (the flow of electric charges) through a coil.

Activity 1

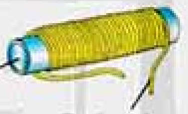
- To show the magnetic force of an electric current.
- The idea of how the electromagnet works.

Materials :

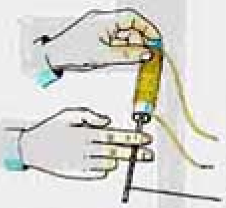
- A long isolated copper wire.
- A dry battery (4.5 volts).
- Iron filings.
- A wrought iron bar (or an iron nail).
- An open-ended plastic tube.

Procedures :

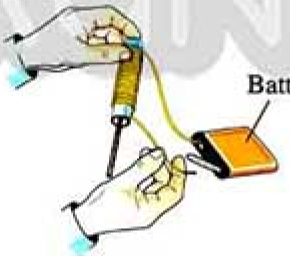
1. Coil the wire in a spiral shape around the plastic tube (as shown in the figure).



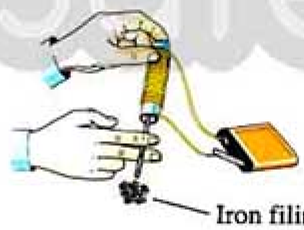
2. Insert the iron bar (or the iron nail) in the tube.



3. Connect the two ends of the wire to the battery.

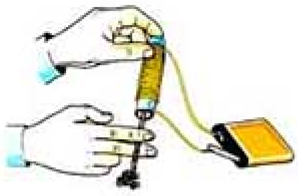


4. Approach the iron bar (inside the tube) to the iron filings.



Observation :

The iron bar attracts the iron filings (the iron bar acts as a temporary magnet when the electric current passes through the wire).



Conclusion :

Electric current has a magnetic effect.

UNIT 2

Applications on electromagnetic forces

The idea of operation of a lot of devices depends on the electromagnetic forces, such as :

A Electromagnet

Structure :

- It is made up of an insulated copper wire coiling around a bar of wrought iron.



Electromagnet

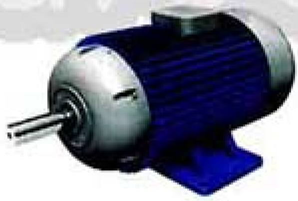
The idea of how it works :

- When the electric current passes through the coil, the wrought iron bar turns into a temporary magnet, and when the electric current is cut off, the wrought iron bar loses its magnetism.

i.e. (it changes the electric energy into a magnetic energy).

Uses :

- It is used in making many devices such as :
  - Electric winches (cranes) which lift scrap iron and cars in ports.
  - Electric bells.

B Electric generator (The dynamo)	C Electric motor
 Electric generator	 Electric motor
Idea of operation :	
It converts the mechanical (kinetic) energy into an electric energy.	It converts the electric energy into a mechanical energy.
Example :	
The dynamo in a bike.	The motor in a fan and a blender (a mixer).

- **We can summarize the changes of energy in each of the electric generator and electric motor in the following diagram.**

Electric generator changes Mechanical energy into Electric energy

Electric motor changes Electric energy into Mechanical energy

Third Nuclear forces

- Scientists have discovered that the atom stores a massive amount of energy inside its **nucleus**.
- This massive energy is accompanied by forces known as nuclear forces, which can be divided into two types :

A Weak nuclear forces :

- They are used to get radioactive elements and radiations, which are used in :
  - Medicine.
  - Scientific researches.
  - Industry.



B Strong nuclear forces :

- These nuclear forces liberate nuclear energy, which is used in :
  - Producing of electric energy.
  - Military purposes.



NB

Egypt seeks to use nuclear energy in producing electricity besides the other forms of energy.

TRY TO ANSWER worksheet 9 in the Notebook

Remember



- **Force :** It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.

Fundamental forces in nature

- Gravitational forces.
- Electromagnetic forces.
- Nuclear forces.
  - A: Weak nuclear forces
  - B: Strong nuclear forces

- **Object's weight :** It is the force of Earth's gravitational to the object.
- **The measuring unit of force and object's weight is** newton (N).
- **The relation used to calculate the weight of an object :**

Object's weight (W) = Object's mass (m) × Earth's gravitational acceleration (g)

Applications of electromagnetic forces

A Electromagnet	B Electric generator (the dynamo)	C Electric motor
• It changes the electric energy into a magnetic energy. • It is used in making many devices, such as : - Electric winches. - Electric bells.	• It changes the mechanical (kinetic) energy into an electric energy.	• It changes the electric energy into a mechanical energy.

Nuclear forces

A Weak nuclear forces :	B Strong nuclear forces :
They are used to get radioactive elements and radiations, which are used in : • Medicine. • Scientific researches. • Industry.	They are used in : • Producing electricity. • Military purposes.

Questions on lesson one

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. When you kick a static ball with your foot, a force acts on the ball which changes the ....
   a. direction of the motion of the ball. b. state of the ball into motion.
   c. mass of the ball. d. (a) and (b).
2. 📖 A force is an effect that ....
   a. always changes the state of an object's motion.
   b. never changes the state of an object's motion.
   c. always changes both object's position and direction.
   d. may change the state of an object's motion.
3. Fundamental forces in nature are ....
   a. gravitational forces. b. electromagnetic forces.
   c. nuclear forces. d. all of the previous forces.
4. The apple falls down due to the effect of ....
   a. electromagnetic force. b. Earth's gravitational force.
   c. weak nuclear force. d. strong nuclear force.



5. 📖 The amount of Earth's gravitational pull on the object is ....
   a. object's mass. b. object's weight.
   c. Earth's gravitational acceleration. d. centrifugal force.
6. .... is the scientist who discovered the Earth's gravitational.
   a. Planck b. Newton c. Archimedes d. Coulomb
7. The work done to lift an object upwards increases by increasing ....
   a. object's volume. b. object's mass. c. object's density. d. no correct answer.
8. 📖 An object's weight on the Earth's surface is related to .... forces.
   a. electromagentic b. gravitational
   c. weak nuclear d. strong nuclear
9. If the mass of an object decreases to its half, the weight ....
   a. increases to the double. b. decreases to the half.
   c. still constant. d. no correct answer.
10. 📖 Earth's gravitational acceleration is changed from a place to another on Earth's surface because of the ....
    a. objects' masses. b. Earth's mass.
    c. the distance from the Earth's centre. d. various temperatures.

UNIT 2

11. The multiplying of object's mass by Earth's gravitational acceleration equals ....
a. object's volume. b. object's mass. c. object's weight. d. no correct answer.

12. If the mass of an object is 2 kg and the Earth's gravitational acceleration is 10 m/sec^2, the object's weight equals ....
a. 0.2 newton. b. 2 newton. c. 20 kg. d. 20 newton.

13. The weight of an object is measured in ....
a. kilogram. b. coulomb. c. newton. d. m/sec^2.

14. The object's weight changes by changing its ....
a. volume. b. velocity.
c. position on Earth's surface. d. (b) and (c) together.

15. The bar used in the electromagnet is made up of ....
a. isolated copper. b. steel iron.
c. wrought iron. d. aluminium.

16. The idea of how the electromagnet works is to change ....
a. mechanical energy into electric energy.
b. electric energy into magnetic energy.
c. electric energy into mechanical energy.
d. magnetic energy into mechanical energy.

17. The electromagnet is used in making the ....
a. calculator. b. electric bell.
c. microscope. d. night vision system.

18. Electromagnetic forces affect the operation of the following except for ....
a. dynamo (electric generator). b. electric motor.
c. car internal combustion engine. d. electromagnet.

19. The .... changes the mechanical energy into an electric energy.
a. electromagnet b. dynamo
c. electric motor d. no correct answer

20. The electric motor changes the ....
a. mechanical energy into an electric energy.
b. electric energy into a magnetic energy.
c. electric energy into a mechanical energy.
d. magnetic energy into a mechanical energy.

21. Electric motor is used in the manufacture of ....
a. radio. b. electric bell.
c. blender (mixer). d. watch.

22. The nuclear radiations used in medicine are produced from ....
a. gravitational forces. b. electromagnetic forces.
c. weak nuclear forces. d. strong nuclear forces.

23. Weak nuclear forces are used in ....
   a. producing electricity. b. scientific researches.
   c. military purposes. d. all the previous uses.
24. We can obtain electric energy from all the following except ....
   a. dynamo. b. electric motor.
   c. electric power stations. d. strong nuclear reactors.
25. Strong nuclear forces are used in ....
   a. medicine. b. industry.
   c. scientific researches. d. military purposes.
26. The idea of working the atomic bomb depends on the use of .... forces.
   a. gravitational b. electromagnetic c. strong nuclear d. weak nuclear

2. Put (✓) or (✗) in front of the following statements and correct the wrong ones :

1. When a force acts on a moving body, the force may change its direction only. ( )
2. You can't push a wall with your hand, because the force acting on it is improper. ( )
3. Fundamental forces in nature are divided into five main kinds. ( )
4. Force is an amount of Earth's gravitational to the body. ( )
5. The exerted work to lift an object decreases by increasing the object's mass. ( )
6. The Earth's gravitational acceleration increases by approaching to the Earth's centre. ( )
7. The gravitational force of the Earth to the rocket increases as it moves away from it. ( )
8. The scientist Coulomb who discovered the Earth's gravitational. ( )
9. The weight of the object changes by changing its place on the Earth's surface. ( )
10. The mass of a person at the equator is less than its mass at the two poles. ( )
11. The gravitational force between an object and the Earth decreases as the mass of the object decreases. ( )
12. The force is measured in newton. ( )
13. Object's weight = its mass + gravitational acceleration. ( )
14. The weight of the object at the north pole is less than its weight at the equator. ( )
15. The effective point of the object's weight is at its centre of gravity. ( )
16. The electric current has a magnetic effect. ( )
17. The bar of the electromagnet is made up of copper. ( )
18. Dynamo changes the heat energy into an electric energy. ( )
19. Electric generator is used in the manufacture of washing machines. ( )
20. Strong nuclear forces are used in generating solar energy. ( )
21. Egypt seeks to use nuclear energy in producing medicine. ( )

3. Write the scientific term of each of the following :

1. The effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the motion direction.
2. • The ability of the Earth to attract an object to its centre.
   • The amount of Earth's gravitational pull on an object.
3. The effective point of the object's weight.
4. The measuring unit of the object's weight.
5. The product of multiplying object's mass by Earth's gravitational acceleration.
6. • An instrument used in making the electric winches and electric bells.
   • An instrument used to change the electric energy into a magnetic energy.
7. An instrument used to change the mechanical energy into an electric energy.
8. An instrument used to change the electric energy into a mechanical energy.
9. Forces which are responsible for getting radioactive elements and nuclear radiations.

4. Complete the following statements :

1. The book on the table remains static because there is no .... acting on it.
2. When you kick a static ball by your foot, a .... acts on it causing its ....
3. Force can change the .... of motion of an object.
4. Force is an effect attempts to change the object's state from being static to .... or vice versa or attempts to change the .... of motion.
5. Fundamental forces in nature are divided into three divisions, which are .... forces, ... forces and .... forces.
6. The work done to lift an object .... by increasing the object's mass.
7. Earth attracts the object to its .... by a force known as the object's ....
8. The effective point of an object's .... is located at its centre and this is known as ....
9. When an object transfers from the equator to the north pole, ... is changed , while .... remains fixed.
10. .... and .... are the factors affecting the gravitational force between the Earth and the object.
11. The measuring unit of the object's mass is ...., while that of its weight is ....
12. The .... of an object is fixed value, while its weight .... from one place to another on the Earth's surface.
13. Object's weight = Earth's gravitational acceleration × ....
14. The weight of an object is measured in .... unit.
15. The object's weight increases as the height from Earth's centre ....
16. If you know that the Earth's gravitational acceleration is 10 m/sec^2, the weight of an object of 3 kg mass is ....
17. The electromagnet is made up of an isolated .... wire coiling around a bar of ....

18. Electromagnet is made by the idea of changing .... energy into .... energy.
19. Electromagnet is used in making .... and ....
20. Electric generator works on changing .... energy into .... energy.
21. Electric motor works on changing .... energy into .... energy.
22. An atom stores a massive amount of energy inside its ....
23. Radioactive elements and nuclear radiations are used in ...., ... and industry.
24. Strong nuclear forces are used in producing .... and in .... purposes.
25. Egypt seeks to use .... energy in producing electricity.

5. Give reasons for :

1. The pencil is still in a static phase on the desk.
2. The static ball moves when you kick it.
3. When you push a wall, it doesn't move.
4. The mass of the object remains constant by changing its position on the Earth's surface.
5. The weight of the object is always greater than its mass.
6. The weight of the object at the south pole is greater than its weight at the equator.
7. The weight of a bag of sugar equals 1 kg a phrase is scientifically not accurate.
8. Object's weight changes from one place to another on the Earth's surface.
9. Gravitational acceleration changes on Earth's surface from one place to another.
10. Electric motor is used in the manufacture of the fans and the washing machines.
11. The wrought iron attracts iron filings after putting it inside an electric coil.
12. The importance of dynamo in the case of cutting off the electric current.
13. The importance of nuclear force.

6. What is meant by ... ?

1. Force.
2. Weight.
3. An object's weight is 60 N.
4. The weight of an object, its mass 1 kg in a certain region on the Earth's surface is 9.8 newton.

7. What is the force responsible for each of the following :

1. Falling of objects towards the Earth's surface.
2. Converting the mechanical energy into an electric energy.
3. Lifting the scrap iron in factories by the electric winches.
4. The emission of some invisible radiations from radioactive elements.
5. Producing electricity from nuclear energy.

8. Explain the idea of operation of each of the following :

1. Electromagnet.
2. Electric generator (Dynamo).
3. Electric motor.

9. Mention one benefit (use) of each of the following :

1. Electromagnet.
2. Electric winches.
3. Electric motor.
4. Weak nuclear force.
5. Strong nuclear force.

10. What happens when ... and why ?

1. You kick a static ball with your foot.
2. An attacker hits the moving ball with his head.
3. You push a wall with your hand.
4. The object's mass increases (relative to the object's weight).
5. Migration of a bird from the south pole to the equator (related to : the mass and the weight of the bird).
6. Approaching from Earth's centre (related to the Earth's gravitational acceleration).
7. Moving away from the centre of the Earth (according to : the mass and the weight of an object).
8. An astronaut moves from the Earth to the Moon (according to : the mass and the weight of the astronaut).
9. An electric current flows through an isolated copper wire which is coiled spirally around a plastic tube containing iron bar and approach it to iron filings.
10. Cutting off an electric current for an electromagnet lifts pieces of iron.

11. Choose the odd word out, then write the scientific name of the rest :

1. Gravitational forces / Friction forces / Nuclear forces / Electromagnetic forces.
2. Work / Mass / Weight / Earth's gravitational acceleration.
3. Electric generator / Electric motor / Electric bell / Bell handwork.

12. Compare between :

1. Mass and weight.
2. Electric generator and electric motor.
3. Strong nuclear forces and weak nuclear forces [Concerning the use].

13. Mention an activity to explain each of the following :

1. The Earth attracts objects.
2. Magnetic force of electric current.

14. Problems :

1. If the Earth's gravitational acceleration in a place is 9.8 m/sec^2, find the weight of the following :

   a. 0.3 kg mass ball.
   b. 50 kg mass boy.

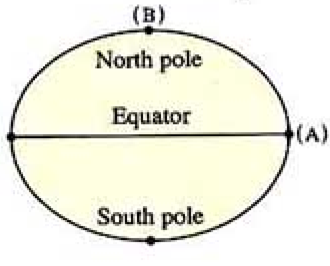
2. Calculate the mass of an object if its weight is 980 newton and the Earth's gravitational acceleration is 9.8 m/sec^2
3. An object is put near the Earth's surface and the Earth's gravitational force is 34.3 newton. Calculate :
   a. The object's weight.
   b. The object's mass. (knowing that the Earth's gravitational acceleration = 9.8 m/sec^2.)
4. The weight of an object on Mars is 32 newton and on Earth is 80 newton. What's the gravitational acceleration on Mars if the gravitational acceleration on Earth is 10 m/sec^2

15. Various questions :

1. Mention three phenomena caused by the effect of the fundamental forces in nature.
2. Mention the main three divisions of forces in nature.
3. Mention the factors affecting the object's weight.
4. Mention the mathematical relationship that links between the weight and mass.
5. If you know that the weight of an object at the equator is less than that its weight at the south pole.
   - Mention the relation between each of the following.
     (1) The mass of the object at the south pole and its mass at the equator.
     (2) The Earth's gravitational acceleration at the equator and the south pole.
6. Explain the structure of electromagnet, and mention its uses.
7. Mention one example for an apparatus depends on electromagnetic force in its working.
8. Mention the uses of nuclear forces (weak and strong).
9. In the opposite figure, some paper clips are attracted to the nail. Explain the reason for this attraction.



10. From the opposite figure, answer the following questions :
    (1) Why is the weight of objects different at the equator from its weight at the two poles ?
    (2) What happens to the weight of an object when it transfers from point (A) to point (B) ? [Give a reason]



11. What is the input energy and output energy in the following devices ?
    (1) Electric motor.
    (2) Electric generator.

Timss Questions

1. Choose :

1. The ratio between the mass of an object at two poles to its mass at the equator is .... one.

   a. more than   b. less than   c. equal to

2. If you have two objects (A) & (B), the weight of object (A) is doubled the weight of object (B) and the mass of object (B) equals 4 kg, so the weight of object (A) = ... newton.
   [knowing that the Earth's gravitational acceleration = 10 m/sec^2.]

   a. 20   b. 40   c. 80

2. Problems :

1. If you have two objects (A) & (B), the mass of object (A) is doubled the mass of object (B) and the weight of object (B) equals 400 newton. Calculate the mass of object (A).
   [knowing that the Earth's gravitational acceleration = 10 m/sec^2.].

2. An object, whose weight is 36 newton on Earth's surface and 6 newton on Moon's surface. Calculate the ratio between the gravitational acceleration on the surface of the Moon and Earth.

3. An object, whose mass is 30 kg on the surface of the Moon. Calculate its weight on :
   (1) Earth's surface.   (2) Moon's surface.
   [knowing that the gravity of Moon equals $\frac{1}{6}$ the gravity of Earth and Earth's gravitational acceleration = 9.8 m/sec^2.].

4. Calculate the gravitational acceleration on the surface of Uranus planet if the weight of an object in there equals 200 newton and its mass on Earth's surface equals 26 kg.

5. A 100 kg rocket was shot vertically upward, the rocket hit a target and lost three quarters of its mass and fell to the ground. Compare between the weight of the rocket before and after shooting.

LESSON

2 Accompanied Forces to Motion



What
are the types of the accompanied forces to motion ?

There are many accompanied forces to motion of objects, the following diagram shows some of them.

Accompanied forces to motion
- **Forces originate due to motion**
  - Forces of inertia
  - Friction forces
- **Forces cause motion**
  - Forces inside living systems

First Forces of inertia

When forces act on objects, which are at rest or moving at a constant speed, these objects resist changes in their motion because of their inertia.

Inertia

It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

UNIT 2

➲ **The following activities show the meaning of inertia practically :**

ACTIVITY 1 To show that objects resist change in the state of motion.

Procedures :

1. Carry some small plastic cubes on your palm and stretch your arm forward.
2. Walk forward fast and suddenly stop at once.



Observation :

The plastic cubes move forward and fall on the ground.

Explanation :

The cubes resist the sudden stopping of the palm of your hand due to inertia, so they continue in the state of motion and fall on the ground.
(The cubes move with the same speed of the person who carries them).

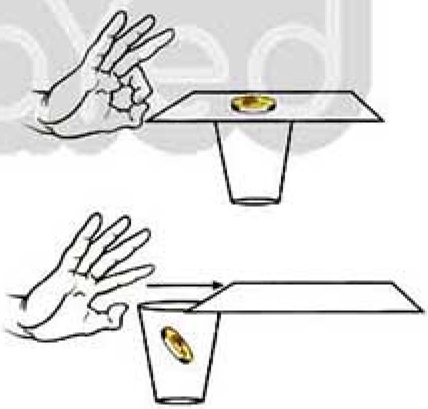
Conclusion :

Force of inertia makes objects resist the change of their motion.

ACTIVITY 2 To show that objects resist change of rest state.

Procedures :

1. Place a piece of construction paper on the top of a glass cup and put a coin on it.
2. Use your forefinger to deliver a quick hit to the paper.



Observation :

The coin falls inside the cup.

Explanation :

The coin resists the sudden movement of the paper due to inertia, so it remains static and it falls in the cup.

Conclusion :

Force of inertia makes objects resist the change of their rest state.

Examples **indicating inertia in our life :**

Examples	Figures	Reasons
1. The passengers and the driver in a moving bus or car (vehicle) are rushed forward when the bus or car stops suddenly GR.		***Due to inertia for the passengers and driver, it makes them resist the sudden stopping of the vehicle to maintain the state of motion , so they rush (force) forward.***
2. The passengers and the driver in a static bus or car (vehicle) are rushed back when the vehicle starts moving forward after it was at rest GR.		***Due to inertia for the passengers and driver, it makes them resist the sudden motion of the vehicle to maintain the state of rest, so they rush back.***
3. A football player rushes forward and falls on the ground if he is tripped during running GR.		***Due to inertia for the football player that makes him resist the sudden stopping of his foot to maintain his state of motion, so he will be forced forward and falls down.***

GR.

Policemen advise drivers to use safety belts in cars.
Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.



TRY TO ANSWER worksheet in the Notebook 10

UNIT 2

Question Complete :

1. Passengers and the driver in a moving car are .... once the car suddenly stops due to the ....
2. Passengers are .... once the vehicle starts moving forward after it was at rest.
3. If a football player is tripped during running forward, he will be .... and .... on the ground.

Answer

1. rushed forward - inertia.
2. rushed back
3. rushed forward - fall down

Second Friction forces

During the motion of an object, friction occurs between the object and the surrounding medium which generates a force known as friction forces against the motion of the object and resist its motion.

Friction forces

They are resistant forces (against motion) originated between the object in motion and the medium touching it.

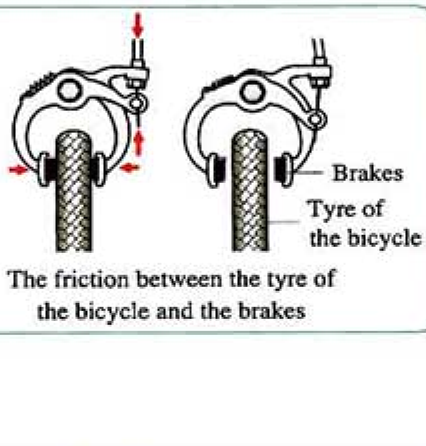
NB

* The surrounding medium may be :
  - A **gaseous** medium as air.
  - A **solid** surface as the ground.
  - A **liquid** surface as water.
* The relation between the friction forces and the speed of the object is **inverse** relationship. «By increasing the friction forces, the speed of the object decreases».

GR.

Once you use the brakes of a moving bicycle, its speed decreases gradually until it stops.

Because the friction between the tyre of the bicycle and the brakes generates a friction force against motion of the bicycle which leads to resist it.



The friction between the tyre of the bicycle and the brakes

➲ **There are benefits and harms of friction forces, we study these in the following diagram :**

Benefits of friction	Harms of friction
1. It prevents feet from slipping on roads during walking.	1. It causes a great loss of mechanical energy because this energy is changed into heat energy.
2. It helps in stopping and starting cars motion.	2. It produces heat energy due to friction between some parts of the machines. This heat causes expansion of these parts and affects their performance.
3. It helps in burning match.	3. It causes the erosion of machines parts and damages them as well.
GR. *Car tyres are covered with a very coarse substance.* To increase friction between tyres and the road to help car in starting motion and stopping.	**GR. *Lubricating and oiling mechanical machines.*** To reduce friction between moving parts of machines and prevent their erosion.





Third Forces inside living systems (biological forces)

There are forces inside living systems (living organisms) whether

- Simple systems such as uni-cellular living organisms
- **Or**
- Complex systems such as multi-cellular living organisms

These forces enable living organisms to do their different biological operations and keep their survival and vitality.

Biological forces

They are forces inside living systems that enable living organisms to do their different biological operations.

UNIT 2

Examples of forces inside living systems :

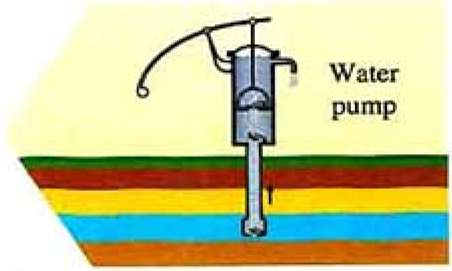
1 **Heart muscle contraction and relaxation** **helps** the heart to pump blood all over the body organs and vice versa. [This is indicated by heart pulses during the movement of blood inside blood vessels].



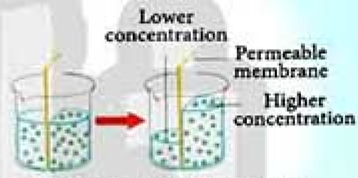
Blood circulation

GR. ***Blood is pumped all over the body organs.***
Due to heart muscle contraction and relaxation.

Note : The role of the heart in raising blood from bottom (lower parts) to top is similar to the role of water pump in raising water from canals and groundwater wells against the Earth's gravity.

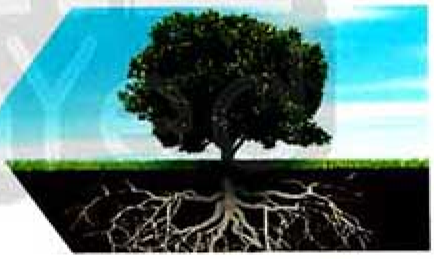


2 **Liquids transport** through pores and the walls of cells from the **lower concentration** to the **higher one.**



Liquids transport through pores

3 **Rising of water and salts** from the soil to plant [from root to stem, then leaves] against Earth's gravity force.



4 **The contraction and relaxation of muscles** **help** the body organs movement.



TRY TO ANSWER worksheets in the Notebook **11 & 12**

Remember

Accompanied forces to motion

- **Forces originate due to motion**
  - **Inertia**
  - **Friction forces**
- **Forces cause motion**
  - **Forces inside living systems**

Inertia

Definition :

It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

Friction forces

Definition :

They are resistant forces (against motion) originate between the object in motion and the medium touching it.

Forces inside living systems

Definition :

They are forces inside living systems that enable living organisms to do their different biological operations.

Benefits of friction :

1. It prevents feet from slipping on roads during walking.
2. It helps in stopping and starting cars motion.
3. It helps in burning of match.

Harms of friction :

1. It causes a great loss of mechanical energy.
2. It produces heat energy due to the friction between some parts of the machines. This heat causes expansion of these parts and affects their performance.
3. It causes the erosion of machines parts and damages them as well.

Examples of forces inside living systems :

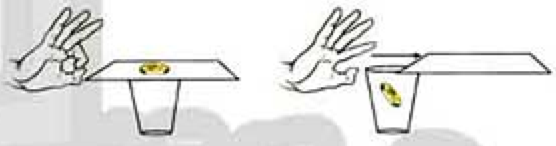
1. Heart muscle contraction and relaxation.
2. Liquids transport through pores and the walls of cells from the lower concentration to the higher one.
3. The contraction and relaxation of muscles.
4. Rising of water and salts from the soil to the plant.

Questions
on lesson two

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. All of the following are accompanied forces to motion except ....
   a. friction force. b. gravitational force.
   c. force of inertia. d. forces inside living systems.
2. 📖 The inertia force affects the .... objects.
   a. moving b. static
   c. moving and static d. no correct answer
3. The coin falls in the cup by a rapid hitting of the paper is an application of ....
   a. force of inertia.
   b. friction force.
   c. gravitational force.
   d. centrifugal force.



4. When a moving bus stops suddenly, the passengers and the driver ....
   a. rush backward. b. rush forward.
   c. turn upside down. d. tend to lean.
5. 📖 When the horse is tripped, the horse rider is suddenly rushed forward, this is related to the force of ....
   a. inertia. b. centrifugal. c. gravitational. d. horse pushing.
6. Passengers are rushed back when a car starts moving suddenly, this is related to ....
   a. centrifugal force. b. force of gravitational.
   c. force of inertia. d. friction force.
7. All of the following are examples of inertia except ....
   a. once the car starts moving forward, the passengers are rushed back.
   b. passengers are rushed forward if the moving car stops suddenly.
   c. if a football player is tripped during running forward, he will be rushed forward.
   d. the gravitational of bodies to the Earth.
8. .... is a technological application on inertia forces.
   a. Car tyres b. Contraction and relaxation of muscles
   c. Safety belts d. No correct answer
9. Electric fan still works for few seconds after cutting the electric current due to .... force.
   a. electromagnetic b. gravitational c. inertia d. friction
10. Friction is always ....
    a. in the same direction of motion. b. against motion.
    c. perpendicular to the motion. d. parallel to the motion in any direction.

11. The car brake performance is an application of ....
   a. gravitational forces. b. friction forces.
   c. centrifugal forces. d. forces of inertia.
12. The following forces are applications of friction except ....
   a. walking on the road. b. car motion due to rotation of its wheel.
   c. operation of dynamo (electric generator). d. stopping the car using the brakes.
13. When using the bicycle brakes, ...
   a. the speed of the bicycle decreases. b. the friction force decreases.
   c. the centrifugal force increases. d. the force of inertia decreases.
14. Friction causes a great loss of mechanical energy because this energy is changed into .... energy.
   a. light b. electric c. heat d. magnetic
15. The idea of machines lubrication depends on the decrease in ....
   a. their weights. b. forces of inertia. c. friction forces. d. forces of gravity.
16. Car tyres are covered with a very coarse substance to ....
   a. reduce the friction with the road. b. reduce the air resistance.
   c. increase the gravitational of wheels to road. d. increase the friction with the road.
17. In which of the following examples, friction is considered a problem ? ....
   a. Burning a match.
   b. Preventing feet from slipping during walking.
   c. Using brakes.
   d. Rising the temperature of mechanical machine parts.
18. .... enable living organisms to do their different biological operations.
   a. Forces of inertia b. Friction forces
   c. Centrifugal forces d. Forces inside living systems.
19. From the examples of forces inside living systems is/are ....
   a. pulse inside blood vessels. b. inertia.
   c. brakes. d. all the previous answers.
20. The heart muscle contraction and relaxation are inferred from ....
   a. inhalation and exhalation processes. b. the pulse inside blood vessels.
   c. the movement of food in digestive system. d. no correct answer.
21. Liquids transport through pores and the walls of cells from ....
   a. outside to inside. b. inside to outside.
   c. low concentration to high concentration.
   d. high concentration to low concentration.
22. Water transports from soil to leaves of plant by the effect of ....
   a. gravitational forces. b. biological forces.
   c. forces of inertia. d. friction forces.

UNIT 2

2. Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Stopping the bicycle after using brakes	a. due to force of inertia.
2. Contraction and relaxation of muscles	b. is one of the forces inside the living systems.
3. A football player is rushed forward and falls if he is tripped during running.	c. due to force of gravitational.
	d. due to friction.

3. Put (✓) or (✗) in front of the following statements and correct the wrong ones :

1. When the speed of a car is 50 km/hour, the speed of the driver is zero. ( )
2. Passengers are rushed backward when a car stops suddenly. ( )
3. Friction is a property of an object has to resist the change of its state. ( )
4. Safety belts in cars work on increasing the forces of inertia. ( )
5. Slowing down of a moving bicycle on a road by brakes is due to its inertia. ( )
6. Friction always opposes motion. ( )
7. Friction prevents feet from slipping on roads during walking. ( )
8. Friction causes a great loss of electric energy because this energy is changed into heat energy. ( )
9. Car tyres are covered with a very smooth substance to increase the friction with roads. ( )
10. Lubricants and oils have no effect on friction. ( )
11. Friction may occur between the surface of a solid object and air. ( )
12. Car brakes are from applications on friction forces. ( )
13. There are forces inside living systems including single-cellular organisms. ( )
14. Heart muscle contraction and relaxation is one of the forces inside living systems. ( )
15. There are forces inside amoeba to keep it survival. ( )
16. Contraction and relaxation of body muscles help in moving. ( )
17. Liquids transport through pores and the walls of cells from the higher concentration to the lower one. ( )

4. Write the scientific term of each of the following :

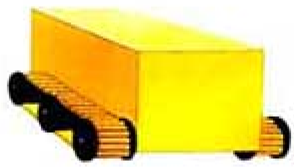
1. It is a property of an object has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
2. A technological application is used in cars and planes to stop the forces of inertia when a sudden change in motion occurs.
3. Resistant forces (against motion) originate between the object in motion and the medium touching it.
4. Forces help in moving and stopping car and bus.
5. Forces that help living organisms to do its biological operations.

5. Complete the following statements :

1. .... and .... are among the accompanied forces to motion.
2. Passengers and the driver in a moving car are .... once the car suddenly stops due to the ....
3. Passengers are .... once the vehicle starts moving forward after it was at rest.
4. If a football player is tripped during running forward, he will be .... and .... on the ground.
5. Any object inside a moving bus has the same .... of the bus so, when the bus stops suddenly, objects fall on the ground due to the force of ....
6. Policemen advise drivers using .... in cars and planes, as they act on stopping the forces of ....
7. .... forces are resistant forces originated between a moving object and the medium touching it.
8. .... force prevents feet from slipping on roads during ....
9. Friction causes a great loss of .... energy because this energy is changed into .... energy.
10. Lubricating and oiling mechanical machines reduce the .... between moving parts and prevent their ....
11. .... and .... are from the benefits of friction.
12. The uni-cellular organisms are from .... living systems, while multi-cellular organisms are from .... living systems.
13. Heart muscle .... and .... help heart to pump blood all over the body.
14. Liquids transport through the walls of the cells from the .... concentration to the .... concentration.
15. The contraction and .... of muscles help the body organs to ....

6. Give reasons for :

1. The car passengers are rushed forward when the moving car stops suddenly.
2. The car passengers are rushed backward when the car moves suddenly.
3. The football player is rushed forward and falls if he is tripped during running forward.
4. Policemen advise drivers to use safety belts in cars and planes.
5. The fan is going to turn after the electric current goes off.
6. Once you use the brakes of a moving bicycle, its speed decreases gradually until it stops.
7. Cars that travel on snow have to carry chains that fit around the tyres.



8. When you drive a car in a city traffic for sometime, the brakes become hot.
9. You are able to run over grass much faster than you run over a ground covered with ice.

10. Car tyres are covered with a very coarse substance.
11. • Spare parts of cars are covered with grease.
    • Lubricating and oiling mechanical machines.
12. The match is ignited when it is rubbed with a rough surface.
13. The presence of oil stains on highways is very dangerous.
14. Friction forces are double edged weapon.
15. Blood is pumped all over the body organs.

7. What is meant by ...?

1. Inertia. 2. Friction. 3. Forces inside living systems.

8. What is the force responsible for each of the following :

1. Falling the coin inside the cup on pulling the paper placed on the top of a glass cup quickly.
2. Ease of the movement on asphalt and difficulty on the gravel.
3. Pulse inside the blood vessels.
4. The rise of water and salts from the soil to the leaves of plant.

9. What happens when ...?

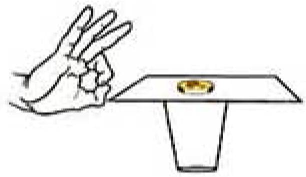
1. A moving bus stops suddenly (concerning the driver and the passengers).
2. A car at rest and suddenly moves forward (concerning the driver and the passengers).
3. You hit quickly a paper placed over a glass cup and a coin placed over the paper.
4. The passengers don't use the safety belts in cars.
5. You ride a bike along a flat road, then you use brakes.
6. Mechanical machines are not lubricated.
7. Friction between two objects quickly (concerning their temperatures).
8. Contraction and relaxation of body muscles.
9. Stopping the movement of a heart muscle (concerning the pulse inside the blood vessels).

10. Various questions :

1. Mention two examples indicating inertia in our life.
2. Show by an activity the concept of inertia.
3. Name three benefits and three harms of friction forces.
4. Mention one application for each of the following :
   (1) Inertia. (2) Useful friction forces.
   (3) Harmful friction forces.
5. Why do you slip when you walk on a wet land ? and this doesn't happen when the land is dry ?
   (Describe what happens in both cases).

6) Mention three examples of forces inside living organisms.

7) **From the opposite figure**. Mention the reason for falling the metallic coin in the cup when pushing the paper quickly. What do you conclude from that ?



8) Adel and Dina draw a horizontal line at the top of a wooden inclined plane as shown in the figure.

Adel put his car at the drawn line and left it to move, the car travels 216 cm. When Dina does the same procedure, her car travels 242 cm. Answer the following :



(1) In which car, friction is larger ?

(2) Why do both cars stop ?

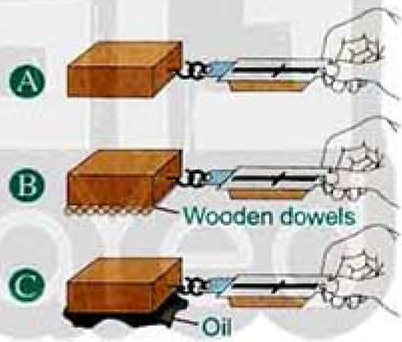
(3) If Dina puts some sand on the inclined plane and leaves her car to travel along it. On which plane does the car travel more slowly ? Why ?

9) **Look at the opposite figures, then answer the following questions :**

(1) Friction in B is .... (greater/less) than in A.

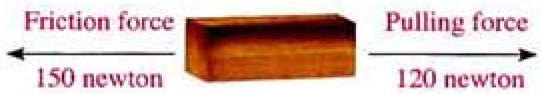
(2) With lubrication (Fig. C) you need .... (more/less) force to move an object.

(3) Lubrication .... (increases/decreases) friction.



11. The opposite figure shows a static object affected by a pulling force equals 120 newton for right and a friction force by Earth equals 150 newton for left.

Answer the following questions :

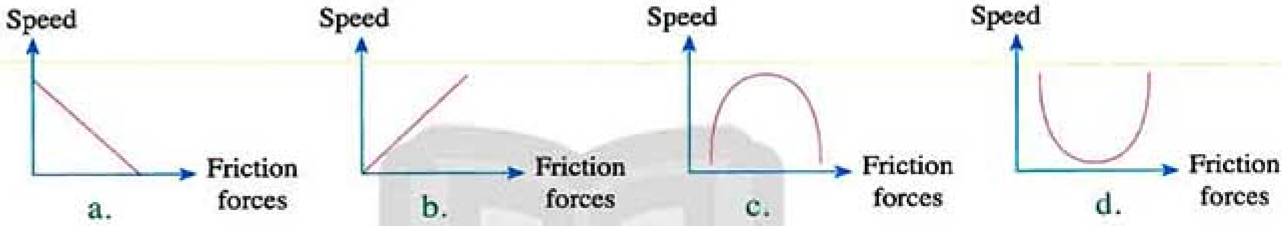


1. Why doesn't the box move from its position ?
2. Why doesn't the box move to left although the value of friction force is more than the value of the pulling force ?

Timss Questions

1. Choose the correct answer :

1. Figure .... represents the relation between the friction forces and the speed of the object.

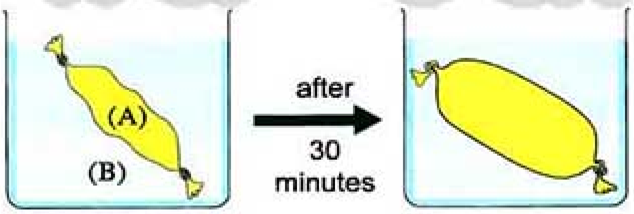


2. The friction force is less than the force that causes movement in case of ....
   - a. putting a ladder based on a wall.
   - b. using the brakes of a bike.
   - c. walking along the way.
   - d. all the previous answers.

2. Give reasons for :

1. It is difficult to pull the boat on the sand of beach and easily in water.
2. Rising the temperature of the outer surface of the spaceship body during landing in the Earth's atmosphere.
3. Continuous pouring water on the tyre of lathe toothed during cutting metals.

3. A part of a chicken intestine is filled with unknown concentration solution and put in a basin filled with another unknown concentration solution, after 30 minutes the intestine is inflated. Answer the following questions :



1. The concentration of solution (A) is .... that of (B).
   - a. more than
   - b. equal to
   - c. less than
2. Which of the two solutions has a concentration 10% and which one has 40% ? Give a reason.
3. What are you expected to happen to the intestine when transferred to a solution, its concentration is 70% ?
4. What are the forces that cause this ?

LESSON 3

Motion



What is meant by motion and its types ?

Motion is a change in position of an object over time relative to a reference point.

In this lesson, we will study :

- Motion
- Relative motion concept
- Types of motion

Motion

- Motion happens all around us. Everyday, we see objects such as cars and motor bikes move in different directions at different speeds.
- When the object's position changes as time passes according to the position of another object, we can say that the object is in a state of motion.

The speed

It is the distance covered by an object in a unit time.

- The measuring unit of speed is m/sec.
- The measuring unit of distance is metre (m).

What is meant by ? The speed of an object is 20 m/sec.

This means that the object covers a distance of 20 m in one second.

UNIT 2

Relative motion concept

- To know the meaning of relative motion, let us study the following applications.

Applications on relative motion in our life :

Applications	Explaining figures	Observations
1. If you are in a moving car and another car moves beside you in the same direction at the same speed.		You will imagine that the two cars stop moving and no motion will be observed.
2. • If your car moves beside a stopping car. **or** • Your car moves at a higher speed and in the same direction of another car.		You will imagine that the other car goes backward (moves in the opposite direction).
3. If you are in a stopping car and another car moves forward beside you.		You will imagine that your car moves backward.
4. If your car moves in an opposite direction to another car that moves at low speed.		You will imagine that the other car moves at a high speed.

➲ **From the previous applications, we can define the following :**

Relative motion

It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.

The reference point

It is a fixed point used to determine the object's position or to describe its movement.

Types of motion

The motion of objects is divided into two types

A Transitional motion.

B Periodic motion.

Transitional motion



It is the motion in which the object's position is changed relative to a fixed point (or a fixed frame of reference) from time to time between initial and final positions.

Examples :

1. A person's motion.



2. A bicycle motion.

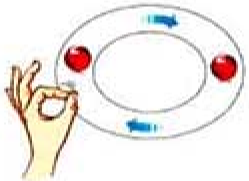


3. A train (or car) motion.



Periodic motion

It is a motion which is regularly repeated at equal periods of time.



Examples :

1. **A vibrating motion :** As the motion of the simple pendulum.



2. **A circular motion :** As the movement of the Moon around the Earth.



3. **A wave motion :** As the motion of water waves [produced after throwing a stone (or a cork piece) in water].



GR.

The movement of the fan arms is a circular periodic motion.

Because it is regularly repeated in equal periods of time.

TRY TO ANSWER worksheet 13 in the Notebook

UNIT 2

Now, we will study the **wave motion** as an example of periodic motion in details :

Wave motion.

The waves causing wave motion are divided into two types

A Mechanical waves.

B Electromagnetic waves.

Mechanical waves

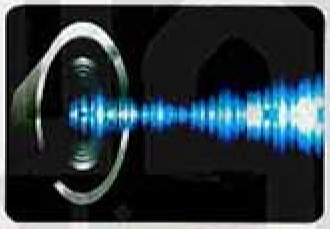
They are waves that need a medium to transfer through.

Their characteristics :

1- They are produced due to the vibration of the medium particles.
2- They don't travel through free space (vacuum).
3- Their speed is relatively low.

Examples :

- Sound waves.



- Water waves.



Electromagnetic waves

They are waves accompanied by electromagnetic forces and they don't need a medium to travel through.

Their characteristics :

1- They are accompanied by electromagnetic forces.
2- They can spread in all media and free space.
3- Their speed is extremely high equals 300 millions m/sec.

Examples :

- Light waves.
- Microwaves.
- Radio waves.
- X-rays.
- Gamma rays.
- Ultraviolet and infrared rays (which are emitted from the Sun).

GR.

- ***We receive the sunlight and we don't hear the sound of solar explosions.***

Because the sunlight is electromagnetic waves, which can travel through space, while the sound of solar explosions is mechanical waves, which can't travel through space.

- ***We see lightning before hearing thunder although they occur at the same time.***

Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, where the speed of electromagnetic waves is much greater than the speed of mechanical waves.



Technological applications of waves

A Some technological applications of sound mechanical waves :

1 Examining and curing equipments for the human body using sound waves (ultrasonic waves).



2 Musical instruments :

a. **Stringed musical** instruments (contain strings) such as : the violin, the lute and the guitar.



b. **Pneumatic musical** instruments such as : flute or reed pipe.



3 Amplifiers and devices of distributing and controlling sound used in broadcasting studios.



B Some technological applications of electromagnetic waves :

1 Ultraviolet (UV) rays :

They are used to sterilize the sets of surgical operations rooms.



UNIT 2

2

X-rays :

They are used in :

- Photographing bones to detect the sites of bone fractures.
- Examining metal (mineral) raws in industry and showing errors, pores and cracks in these minerals.
- Studying the inner structure of minerals crystals.



3

Gamma rays :

They are used in medical purposes as the treatment and discovering of some swellings (tumors).



4

Visible (seen) light :

It is used in :

- Photographic cameras.
- Television cameras.
- Light shows (data show).



5

Infrared (IR) rays :

They are used in :

- Night vision systems used by modern military forces.
- Remote sensing instrument to photographing the Earth's surface using satellites.
- Cooking food GR. **because these rays have heat effect property**.
- Making remote sets to control and operate electric sets (TV, DVD, air conditioner ...)







NB

- The ultraviolet rays, X-rays and gamma rays are used in medical purposes.
- Infrared rays and visible light are used in photography.

TRY TO ANSWER worksheet 14

- General Exercise of the School Book on Unit 2
- Model Exams on Unit 2 in the Notebook

Remember



✪ Speed :

It is the distance covered by an object in a unit time.

✪ Relative motion :

It is the change in an object's position or direction as the time passes relative to another object or a fixed point known as frame of reference.

✪ Types of motion :

(1) Transitional motion :

It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final positions.

Ex. Train motion & car motion.

(2) Periodic motion :

It is a motion which is regularly repeated at equal periods of time.

Ex. - **Vibrating motion :** as motion of simple pendulum.

- **Circular motion :** as the movement of the Moon around the Earth.
- **Wave motion :** as motion of water waves.

The waves causing wave motion are divided into

A Mechanical waves.	B Electromagnetic waves.
1. They are produced by the vibration of the medium particles.	1. They are accompanied by electromagnetic forces.
2. They need a medium to transfer through.	2. They spread in all media and free space.
3. Their speed is relatively low.	3. Their speed is extremely high equals 300 millions m/sec.
Examples :	**Examples :**
- Sound waves.	- Light waves.
- Water waves.	- X-rays.
	- Radio waves.

Applications of electromagnetic waves and their uses :

Infrared (IR) rays :

They are used in :

- Night vision apparatus used by modern military forces.
- Remote sensing instrument to photographing Earth's surface using satellites.
- Cooking food.
- Making remote sets.

Ultraviolet (UV) rays :

They are used to sterilize the sets of surgical operations rooms.

X-rays :

They are used in :

- Photographing bones to detect the sites of bone fractures.
- Examining mineral raws in industry and showing errors, pores and cracks in these minerals.

Gamma rays :

They are used in medical purposes as the treatment and discovering of some swellings.

Visible (seen) light :

It is used in :

- Photographic cameras.
- Television cameras.
- Light shows.

Questions on lesson three

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. The change in an object's position or direction as the time passes relative to a frame of reference is called .... motion.
   a. periodic b. vibrating c. relative d. circular
2. When two cars move in the same direction with a velocity 80 km/h., the driver of the first car imagines that the second car moves with velocity .... km/h.
   a. zero b. 80 c. 160 d. no correct answer.
3. If you are in a moving train, you imagine that cars moving in the same direction on the road at smaller speed ....
   a. stop. b. move forward.
   c. move backward. d. move with a high speed.
4. The motion of the following objects are transitional motion except the motion of ....
   a. train. b. simple pendulum. c. car. d. bicycle.
5. 📖 In the periodic motion, the ....
   a. pathway is straight. b. motion is regularly repeated.
   c. mass is regularly repeated. d. speed is regularly changed.
6. The motion of a simple pendulum is considered .... motion.
   a. vibrating b. circular c. wave d. transitional
7. The movement of the Moon around the Earth is considered .... motion.
   a. vibrating b. circular c. wave d. transitional
8. 📖 All of the following are periodic motions except the ....
   a. movement of the Moon around the Earth. b. pendulum motion.
   c. train motion. d. sunflower motion.
9. All of the following are motions regularly repeated in equal periods of time except ....
   a. wave motion. b. circular motion.
   c. vibrating motion. d. transitional motion.
10. The movement of electrons around the nucleus is considered .... motion.
    a. vibrating b. circular c. transitional d. wave
11. All of the following are properties of sound waves except ....
    a. it is mechanical waves.
    b. it is produced due to vibration of medium particles.
    c. it needs a medium to travel.
    d. it travels through free space.

12. Sounds are produced due to ....
  a. vibration of medium particles. b. electromagnetic forces.
  c. electrostatic forces. d. wave motion.
13. Mechanical waves are characterized by ....
  a. their speed is greater than that of electromagnetic waves.
  b. their speed is 300 millions m/sec.
  c. their need for a medium to propagate through. d. (a) and (c).
14. .... waves is an example of mechanical waves.
  a. Water b. Light c. Radio d. Ultraviolet
15. .... are used in examining and curing sets for human body.
  a. Ultrasonic waves b. Gamma rays c. Infrared rays d. X-rays
16. All of the following are electromagnetic waves except for the ....
  a. thermal (infrared) rays. b. visible light.
  c. sound waves. d. ultraviolet rays.
17. We see lightning before hearing thunder because ....
  a. lightning occurs before thunder.
  b. sound needs a medium to travel through.
  c. the speed of light is 340 m/sec.
  d. the speed of light is much greater than that of sound.
18. The speed of both .... in space equals 300 million m/sec.
  a. sound and light b. X-rays and gamma rays
  c. infrared rays and water waves d. ultraviolet rays and sound waves
19. All of the following are stringed musical instruments except ....
  a. violin. b. flute. c. lute. d. guitar.
20. Sound waves are used in all the following except ....
  a. examining and curing sets. b. making remote sets.
  c. musical instruments. d. amplifiers.
21. .... are used in night vision apparatus.
  a. Infrared rays b. Ultraviolet rays
  c. Gamma rays d. X-rays
22. Infrared rays are used in cooking food because they have .... effect property.
  a. light b. magnetic c. heat d. electric
23. Infrared rays are used in all of the following applications except in ....
  a. night vision apparatus. b. cooking food.
  c. making remote sets. d. sterilization.

24. X-rays are used in ....
    a. treatment and discovering some swellings.
    b. photographing bones to detect bone fractures.
    c. sterilizing the sets of surgical operation rooms.
    d. remote sensing instruments to photograph the Earth's surface.

25. .... are used in examining mineral raws in industry.
    a. X-rays b. Ultraviolet rays
    c. Infrared rays d. Gamma rays

26. .... are used in medical purposes as the treatment and discovering some swellings.
    a. X-rays b. Ultraviolet rays
    c. Infrared rays d. Gamma rays

27. .... is among the applications of ultraviolet rays.
    a. Photographing bones b. Night vision apparatus
    c. Sterilizing of the sets of surgical operation rooms
    d. Discovering of some swellings

28. Visible light is used in all of the following applications except in ....
    a. night vision apparatus. b. television cameras.
    c. photographic cameras. d. data shows.

29. The speed of waves of X-rays in space is .... the speed of waves of infrared rays.
    a. doubled b. less than c. more than d. equal to

2. Choose from column (B) what suits it in column (A) :

(A) Electromagnetic waves	(B) Technological application
1. Gamma rays	a. studying the inner structure of minerals crystals.
2. X-rays	b. treatment of some swellings.
3. Visible light	c. night vision apparatus.
4. Infrared rays	d. photography.
5. Ultraviolet rays	e. sterilize the sets of surgical operations rooms.
	f. wireless communications.

3. Put (✓) or (×) in front of the following statements and correct the wrong ones :

1. When your car moves at a higher speed and another car which moves in the same direction passes, you will imagine that the other car goes forward. ( )
2. When you are in a moving car and another car moves beside you in the same direction at the same speed, you will imagine that the two cars don't move. ( )

3. The motion of a boy from his house to the school is a periodic motion. ( )
4. The fixed point that is used to determine the position of objects is known as the reference point. ( )
5. Motion is divided into two types, which are circular motion and transitional motion. ( )
6. Periodic motion is changed between initial and final positions. ( )
7. Simple pendulum motion is a wave motion. ( )
8. The movement of the Moon around the Earth is a circular motion. ( )
9. Water waves motion is a periodic motion. ( )
10. Transitional motion differs from periodic motion as it has initial and final points and it doesn't repeat its motion. ( )
11. Water waves are electromagnetic waves. ( )
12. Sound waves are produced due to the vibration of medium particles. ( )
13. Electromagnetic waves are accompanied by gravitational forces. ( )
14. Ultraviolet rays are used in examining and curing sets for the human body. ( )
15. Sound waves are used in pneumatic musical instruments, such as violin and guitar. ( )
16. Ultraviolet rays are used in making remote sets and in night vision apparatus. ( )
17. X-rays are used in cooking food as they have heat effect property. ( )
18. Infrared rays are used in sterilizing the sets of surgical operations rooms. ( )
19. Gamma rays are used in photographing bones. ( )
20. X-rays are used in examining mineral raws in industry. ( )
21. Gamma rays are used in treatment and discovering some swellings. ( )
22. We use infrared rays in light shows. ( )

4. Write the scientific term of each of the following :

1. The distance covered by an object in a unit time.
2. It is the change of an object's position or direction as time passes relative to a fixed point.
3. A fixed point used to determine the object's position or to describe its movement.
4. It is the motion of an object in which its position changed relative to a fixed point from initial to final positions.
5. An object's position changes as time passes from its initial position to a different final one.
6. The motion which is regularly repeated in equal periods of time.
7. A kind of motion, which is produced by a simple pendulum.
8. A kind of motion, which is produced from the movement of the Moon around the Earth.
9. A kind of motion by which sound and light are transferred from one place to another.
10. Waves produced due to the vibration of medium particles.

11. Waves which need a medium, such as air to transfer through.
12. Waves which don't need a medium to travel through.
13. Waves which are accompanied by electromagnetic forces.
14. Electromagnetic rays have a thermal effect.

5. Complete the following statements :

1. Relative motion is the change in an object .... or .... as the time passes relative to another object or a fixed point known as ....
2. When two cars move in the same direction at the same speed, drivers imagine that the two cars .... moving and no motion will be observed.
3. If car (A) moves at a higher speed than car (B), the driver in car (A) will see in the mirror that car (B) moves in .... direction.
4. Types of motion are .... motion and .... motion.
5. Transitional motion is the motion in which the object's .... is changed from time to time relative to a fixed frame of reference from .... position to another .... one.
6. The movement of the Moon around the Earth is a .... motion, while that of the bicycle and the train is a .... motion.
7. Transitional motion is not considered as periodic motion because it has .... and .... points and it doesn't .... its motion.
8. .... motion is a motion which is regularly repeated in .... periods of time.
9. .... , ... and .... are examples of periodic motion.
10. The motion of simple pendulum is considered .... motion, while that is produced from throwing a stone in water is considered .... motion and both are considered as forms of .... motion.
11. Waves are divided into two kinds, which are .... waves and .... waves.
12. Sound waves and .... waves are examples of .... waves.
13. Mechanical (sound) waves don't transfer through .... but they need a .... like air to transfer through.
14. Mechanical waves are produced due to the .... of the medium ....
15. Electromagnetic waves don't need a .... to travel through, so they can travel through ....
16. Water wave is an example of .... waves, while light wave is an example of .... waves.
17. Electromagnetic waves are accompanied by .... forces.
18. .... and .... rays are emitted from the Sun.
19. .... , ... and .... are examples of electromagnetic waves.

20. Thunder sound transfers in a form of .... waves, whereas lightning flash transfers in a form of .... waves.
21. We see lightning before hearing thunder , because the speed of sound is .... than the speed of light.
22. Light waves can spread out in all media and .... with a speed of .... m/sec.
23. The violin and the guitar are among .... musical instruments, while .... and reed pipe are among .... musical instruments.
24. .... rays are used in night vision apparatus, while .... rays are used in photographic cameras.
25. .... rays are used in sterilizing the sets of surgical operations rooms, while .... rays are used in discovering some swellings.
26. .... rays are used in cooking food as they have .... effect.
27. .... and .... are among the applications of X-rays.
28. Visible light is used in .... , TV cameras and in ....
29. .... rays are used in remote sensing instruments.

6. Give reasons for :

1. The movement of trees and buildings related to a person in a moving car is considered a relative motion.
2. A train motion is a transitional motion.
3. • Vibrating motion is a periodic motion.
   • Circular motion is a periodic motion.
   • The motion of the pendulum is a periodic motion.
4. Transitional motion differs from periodic motion.
5. We receive the sunlight at the same time we don't hear the sound of solar explosions.
6. Astronauts can't hear each other voices directly in space.
7. We see lightning before hearing thunder although they occur at the same time.
8. Sound needs a medium to travel through, while light travels through space.
9. Sound and water waves are mechanical waves.
10. Remote sets don't need a medium to control operating the electrical appliances.
11. Infrared rays are used in cooking.
12. X-rays are used in photographing bones.
13. X-rays are used in examining mineral raws in industry.
14. Gamma rays have medical purposes.
15. Exposing dental treatment tools for ultraviolet rays before reuse.

7. Define each of the following :

1. 📖 Speed.
2. 📖 Relative motion.
3. Mechanical waves.
4. Electromagnetic waves.
5. 📖 Periodic motion.
6. 📖 Transitional motion.

8. What happens when ... ?

1. Two objects move at the same speed and in the same direction.
2. A car next to your stopping car moves backward suddenly.
3. A car next to your stopping car moves forward suddenly.

9. Give an example indicating each of the following :

1. Relative motion.
2. Transitional motion.
3. Vibrating motion.
4. Circular motion.
5. Wave motion.
6. Mechanical waves.
7. Electromagnetic waves.
8. Rays emitted from the Sun.
9. Stringed musical instruments.
10. Pneumatic musical instruments.
11. Rays have heat effect property.

10. Choose the odd word out (mention the reason for your choice) :

1. A person motion / A simple pendulum motion / A car motion / A train motion.
2. The movement of the rotary swing / The movement of the electrons around the nucleus / The movement of the Moon around the Earth / The movement of a piece of cork on the surface of shaking water.
3. Transitional motion / Vibrating motion / Circular motion / Wave motion.
4. Radio waves / Microwaves / Water waves / X-rays.
5. Light waves / Sound waves / Water waves.

11. Mention the name of rays (or waves) which are used in each of the following :

1. Medical examining.
2. Examining and curing sets for the human body.
3. Remote sensing instrument to photograph the Earth's surface using satellites.
4. Cooking food.
5. Making remote sets to control and operate electric sets.
6. Sterilizing the sets of surgical operations rooms.
7. Photographing bones to detect the sites of bone fractures.
8. Examining mineral raws in industry.
9. Treatment and discovering some swellings.
10. Photographic cameras.
11. Television cameras and light shows.

12. Mention one application of each of the following rays :

1. Sound waves.
2. Infrared rays.
3. Ultraviolet rays.
4. X-rays.
5. Gamma rays.
6. Visible light.

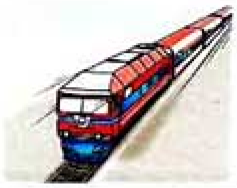
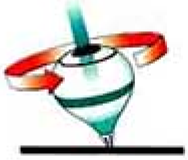
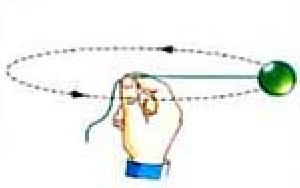
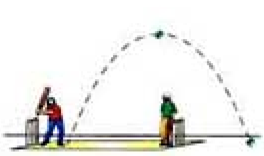
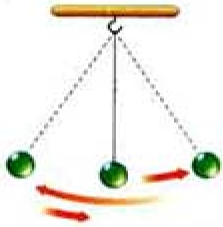
13. Compare between :

1. Transitional motion and periodic motion. [Give examples of each of them].
2. • Mechanical waves and electromagnetic waves.
   • Light waves and sound waves.
3. Train motion and fan arms motion.
4. Simple pendulum motion and water waves motion.

14. Various questions :

1. Mention three examples of the transitional motion.
2. Mention three examples of the periodic motion.
3. Mention two examples of each of the mechanical waves and electromagnetic waves.
4. Mention three kinds of electromagnetic waves used in photographing field.

15. Mention the type of motion represented by each figure :

(1) 	(2) 	(3) 
(4) 	(5) 	(6) 
(7) 	(8) 	(9) 



1. If a bicycle moves for 15 minutes.

a. between two points.

b. in a circle around a certain point several times.

Which of these motions is periodic motion and which is transitional motion ? Why?

2. When watching a football match at the stadium, the voice of the internal broadcaster was heard from the radio before hearing his voice from the internal radio in the stadium Explain why.

3. Describe the motion of each of the following objects :

1. A car moves beside your car in the same direction at the same speed.
2. Your car moves beside a stopping car.
3. A car moves beside your car in the opposite direction.
4. A train moves from Alex. to Cairo.
5. Sunflower plant.

UNIT

3

Earth and Universe



Lessons of the unit :

1. Celestial Bodies.
2. The Earth.
3. Rocks and Minerals.

Unit Objectives :

By the end of this unit, students will be able to :

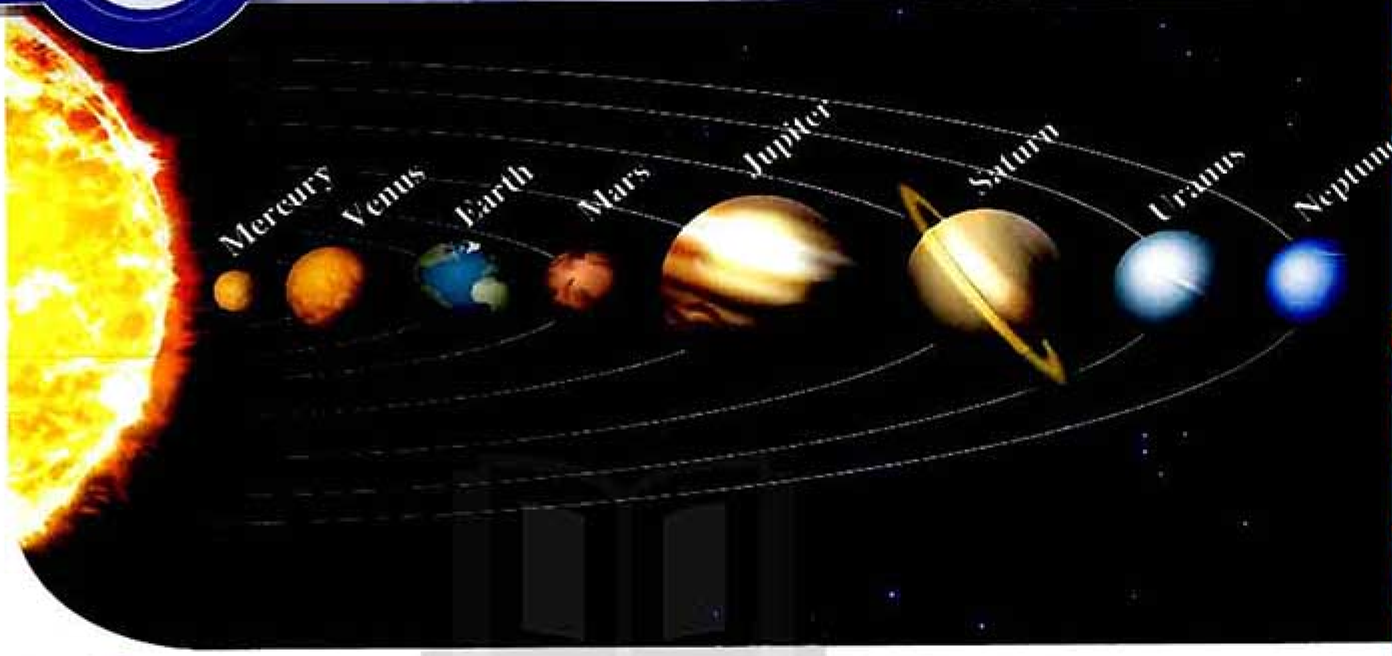
- Identify planets, stars and moons.
- Identify asteroids, comets and meteorites.
- Compare between the planet, the star and the moon.
- Compare between the planets and asteroids.
- Explain the difference of gravity from a planet to another.
- Identify the characteristics of the inner and outer planets.
- Compare between the characteristics of both inner and outer planets.
- Explain some celestial bodies pictures that are taken by telescopes or satellites.



- Identify the location of the Earth in the solar system.
- Identify the Earth's volume, shape and mass.
- Explain the characteristics of the Earth that support the continuity of life.
- Indicate the inner structure of the Earth.
- Explain the different types of rocks.
- Compare between the three types of rocks.
- Give examples of different types of rocks.
- Identify some minerals that forming rocks.
- Appreciate the grandeur of Allah in providing all reasons for life on the Earth's surface.

LESSON 1

Celestial Bodies



What are the celestial bodies ?

- *There are many bodies found in the universe such as stars, planets, moons, ... etc., these bodies are called celestial bodies.*
- *All of celestial bodies are in a permanent motion according to the will of Allah.*

Celestial bodies

They are bodies swim in space such as stars, planets, moons and rocky or gaseous bodies.



Stars

- When you look at the sky in a clear moonless night, you will see a huge number of bright bodies called **"Stars"**.

Stars

They are big-sized bodies that emit enormous amounts of heat and light.

- They appear small although they are big-sized GR. ***because they are millions of kilometres away from us.***
- The distances between stars are very large, so astronomers don't measure them in kilometres, but with the "Light year".

Light year

It is the distance covered by light in one year and it equals 9.467×10^{12} km.

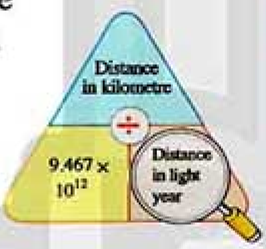
$$\text{Distance in light year} = \frac{\text{Distance in km}}{9.467 \times 10^{12}}$$

What is meant by ? The distance between the Sun and a star is three light years.

➲ This means that the distance between the Sun and this star $= 3 \times 9.467 \times 10^{12}$
$= 28.401 \times 10^{12}$ km.

To calculate the distance in light year

Ex. Calculate the distance in light year between two stars, if the distance between them equals 37.868×10^{12} km.



Solution :

Distance in light year

$$= \frac{\text{Distance in kilometre}}{9.467 \times 10^{12}}$$

$$= \frac{37.868 \times 10^{12}}{9.467 \times 10^{12}} = 4 \text{ light years.}$$

To calculate the distance in kilometre

Ex. Calculate the distance in kilometre between the Sun and a star if the distance between them equals 5 light years.



Solution :

Distance in km

$= \text{Distance in light year} \times 9.467 \times 10^{12}$

$= 5 \times 9.467 \times 10^{12}$

$= 47.335 \times 10^{12}$ km.

GR.

- ***The stars seem as light points although they are huge.***
- ***The stars seem as very small light points in spite of their big sizes.***
  Because they are far from us.
- ***Astronomers do not measure the distances between stars in kilometres.***
  Because these distances are too huge to be measured in kilometres.

Galaxies

The stars are found in groups called "Galaxies".

Galaxies

- They are the greatest units that form the universe.
- They are a tremendous collection of stars.
- They are a system that consists of thousands of millions of stars.

UNIT 3

- The galaxy that our **solar system** belongs to is known as "The Way of Chopped Hay galaxy" or "The Milky Way galaxy".



Milky Way galaxy

- Milky Way galaxy takes an oval shape with coiled spiral arms extend from it, the Sun lies on one of these spiral arms.



Position of the Sun in the Milky Way galaxy

For illustration

The Milky Way galaxy is given that name, because it appears in the sky at night as a splashing milk or spreading straw.

• ***We can summarize the previous explanation in the following diagram :***

The celestial bodies → found in groups called → Galaxies → our galaxy in the universe is called → The Milky Way galaxy → which contains → Our solar system

The discovery of the celestial bodies

- Astronomers discovered the celestial bodies by instruments called "Telescopes".
- • Function of telescopes :
- They are used for identifying the celestial bodies.

Types of telescopes

1 Reflecting telescope



2 Refracting telescope



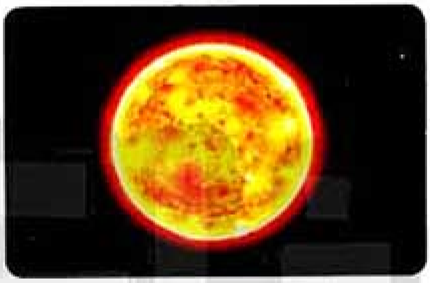
Solar system

➲ Through the astronomical explorations, astronomers knew that the solar system consists of some celestial bodies that are shown in the following diagram :

The solar system consists of

1. The Sun
2. Planets
3. Moons
4. Asteroids
5. Meteors
6. Meteorites
7. Comets

1 The Sun :



- *It is the star of our solar system.*
- It is the biggest body in the solar system.
- It lies in the centre of the solar system and the other bodies of the solar system revolve around it.

2 Planets :

Planets

They are eight spherical opaque bodies revolve around the Sun in one direction (anti-clockwise) in semi-circular or elliptical (oval) paths.

- The paths of planets lie in one plane perpendicular to the Sun's axis of rotation around itself.

GR.

Planets revolve around the Sun in fixed orbits.

Due to the attraction force of the Sun to the planets.

Exercise **Complete :**

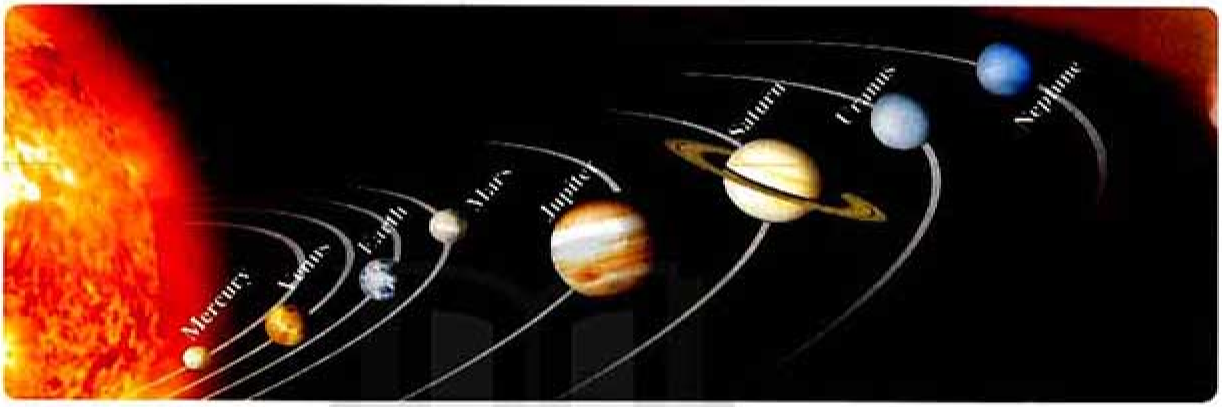
1. Any body swims in the space is called ....
2. The types of telescopes are .... and .... telescopes.

UNIT 3

The arrangement of planets :

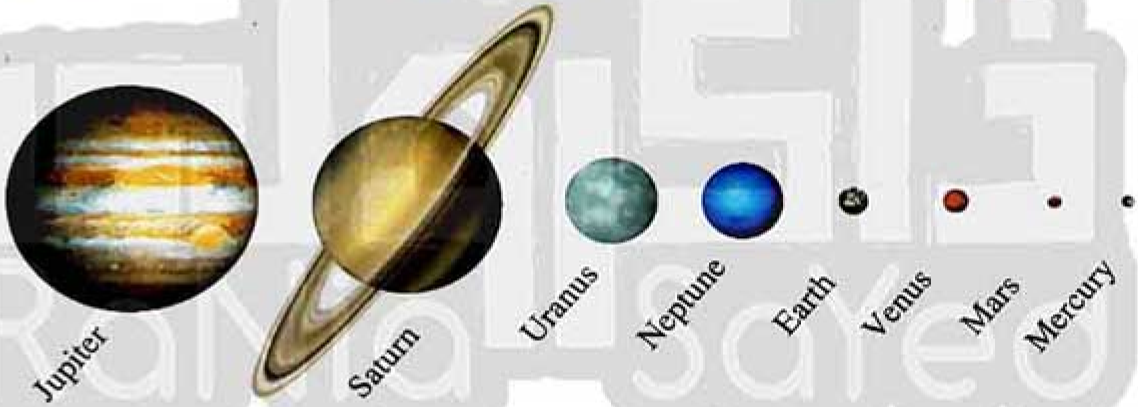
1. According to their distances from the Sun (beginning from the nearest to the farthest) as follows :

Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune



2. According to their sizes (beginning from the biggest to the smallest) as follows :

Jupiter - Saturn - Uranus - Neptune - Earth - Venus - Mars - Mercury



NB

- Mercury is the nearest planet to the Sun , while Neptune is the farthest planet from the Sun.
- Jupiter is the biggest planet in the solar system, while Mercury is the smallest one.
- The nearest two planets to the Earth are Venus and Mars.
- The Earth planet has the highest density.
- The Earth planet occupies :
  - The third order according to the distance from the Sun.
  - The fourth order (ascendingly) according to the volume.
  - The fifth order (descendingly) according to the volume.

Classification of planets

The planets of the solar system are divided into two groups according to their distances from the Sun, which are :

A The small or inner planets group	B The big or outer planets group
Distance from the Sun	
• The nearest four planets to the Sun are : 1. Mercury. 2. Venus. 3. Earth. 4. Mars. So, they are called the inner planets group.	• The farthest four planets from the Sun are : 1. Jupiter. 2. Saturn. 3. Uranus. 4. Neptune. So, they are called the outer planets group.
Size	
• They are small, so they are called small planets.	• They are big, so they are called giant planets.
Structure	
• They are rocky bodies that have a solid surface.	• They are gaseous bodies that are formed of gaseous elements in a solidified state (the most important of them are hydrogen and helium).
Density	
• Their densities are high (ranging between 3.3 to 5.5 gm/cm^3.) GR **because they consist of solid bodies.**	• Their densities are low (ranging between 0.7 to 1.3 gm/cm^3.) GR **because they consist of gaseous bodies.**
Atmosphere	
• All of them have an atmosphere except Mercury.	• All of them have an atmosphere.
Moons	
• Mercury and Venus have no moons. • The Earth has one moon, while Mars has two moons rotating around them.	• They have large number of moons rotating around each of them.

GR

The presence of hydrogen gas in a solidified state on the surface of outer planets.

Due to the high pressure and extreme coldness on the surfaces of these planets.

The difference of gravity acceleration on the surfaces of the planets :

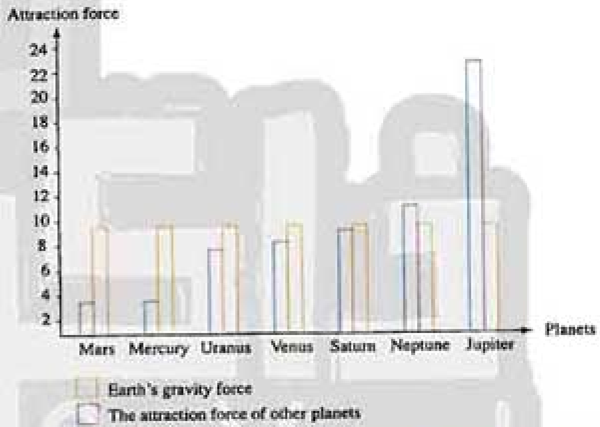
You know from the previous unit that the scientist Isaac Newton was the first one who discovered the Earth's gravity force when he was standing under a tree and he found an apple falling down to the ground.

Then he proved that there is a force of gravity (attraction force) between any two objects in the space.

The force of gravity depends on

1. **The mass of each object** "directly proportional"
2. **The distance between them** "inversely proportional"

The force of gravity differs from a planet to another according to the difference in its mass , where the gravity of the planet increases by increasing its mass and vice versa.



The force of gravity on the surface of planets

★ **The following table shows the ascending order of the planets according to the acceleration due to gravity on its surfaces :**

Planet	Mars	<	Mercury	<	Uranus	<	Venus	<	Saturn	<	Earth	<	Neptune	<	Jupiter
Acceleration due to gravity on its surface (m/sec^2)	3.72		3.78		7.77		8.60		9.05		9.78		11.00		22.88

GR.

The gravity on the Earth's surface is larger than that on Mars surface.

Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.

Notes

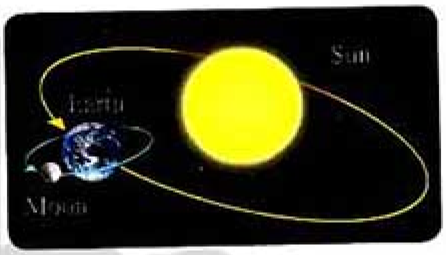
- Acceleration due to gravity is the largest on Jupiter planet, while it is the least on Mars planet.
- The Earth has the largest gravity on its surface in the inner planets.

TRY TO ANSWER worksheet 15 in the Notebook

3 Moons :

Moons

They are followers (small space bodies) that are affected by the gravity of the planets that rotate around them.



As in case of our Moon, which is the follower of the Earth.

The following table shows the number of moons, which rotate around each planet of the solar system :

Planet	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune
No. of moons rotating around it	–	–	1	2	62	60	27	12

GR.

The Moon is considered the follower of Earth planet.

Because the Moon rotates around the Earth planet and it is affected by its gravity.

4 Asteroids :

- ***They are thousands of different sized rocky masses that rotate around the Sun in a certain region called "the belt of the wanderer asteroids" which lies between the orbits of Mars and Jupiter.***



Asteroids

UNIT 3

Asteroids

They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.

The belt of the wanderer asteroids

It is a region that separates the group of the inner planets from the group of the outer planets.



The belt of the wanderer asteroids — Asteroids of different sizes — Asteroid

- Some of these rocky masses may emerge from their orbit around the Sun and swim in space, but some of them penetrate the Earth's atmosphere in the form of meteors and meteorites.

5 Meteors :

Meteors

They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.



Meteors

GR.

Sometimes, we see some luminous lines in the sky at clear nights.

Due to the burning of small rocky masses when they penetrate the Earth's atmosphere as a result of heat produced from their friction with air forming meteors.

6 Meteorites :

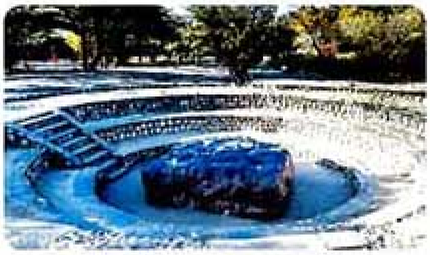
Meteorites

They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.



Meteorites

- The biggest meteorite till now has a mass of 80 tons and exists at the southern west of Africa.


The biggest meteorite

What happens when ?

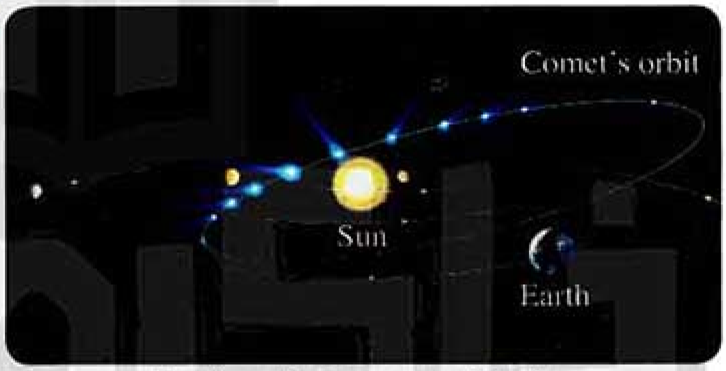
A large asteroid (meteorite) penetrates the Earth's atmosphere.

➲ **Its outer surface burns only and the remaining part of it without burning falls on the Earth's surface.**

7 Comets :

Comets

They are masses of rocks, ice and solidified gases that revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.



Rotation of comets around the Sun

Structure of comet :

The comet consists of two parts, which are

1 The head

It is the first part of the comet and it contains icy spheres, which are a mixture of :
- Solidified gases [carbon dioxide, nitrogen and methane gases].
- Rocky parts.
- Dust and water molecules.


Structure of comet

2 The tail

It is the second part of the comet and it is considered a gaseous cloud.

The most famous comet is Halley, which completes its revolution around the Sun every 76 years.

TRY TO ANSWER worksheet 16 in the Notebook

Remember

Celestial bodies :

They are bodies swim in the space such as stars, planets, moons and rocky or gaseous bodies.

Light year :

It is the distance covered by light in one year and it equals 9.467×10^{12} km.

Galaxies :

- They are the greatest units that form the universe.
- They are a tremendous collection of stars.

The galaxy that our solar system belongs to is the Milky Way galaxy.

Solar system consists of :

1. The Sun :

It is the star of our solar system.

2. The Planets :

They are eight spherical opaque bodies revolve around the Sun in oval orbits.

Inner planets group

They are the nearest four planets to the Sun in the solar system. [Mercury - Venus - Earth - Mars]

Outer planets group

They are the farthest four planets from the Sun in the solar system. [Jupiter - Saturn - Uranus - Neptune]

3. Moons :

They are followers (small space bodies), that are affected by the gravity of the planets that rotate around them.

4. Asteroids :

They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.

5. Meteors :

They are small rocky masses that burn up completely when fall within the atmosphere of the Earth and seen in the sky as luminous arrows.

6. Meteorites :

They are large rocky masses that fall from the space and reach the Earth's surface.

7. Comets :

They are solidified masses of ice, gases and rock pieces that revolve around the Sun.

Questions on lesson one

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

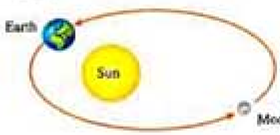
1. .... emit large amounts of heat and light.
   a. Stars b. Galaxies c. Planets d. Moons
2. The distance between stars are measured in .... unit.
   a. metre b. kilometre c. newton d. light year
3. The distance covered by the light in one year is called ....
   a. astronomical unit. b. light year.
   c. speed of light. d. kilometre.
4. Astronomers measure the distances between stars with light year, because the stars ....
   a. generate great amounts of light and heat.
   b. are near from each other.
   c. are millions of kilometres away from us.
   d. seem as small light points.
5. The distance covered by light in two years equals .... km.
   a. 9.467×10^{12} b. 9.467×10^{6}
   c. 18.934×10^{12} d. 18.934×10^{6}
6. If a star is far from the Sun by 47.335×10^{12} km. , then the distance between them is .... light years.
   a. 2 b. 3 c. 4 d. 5
7. The greatest units that form the universe are ....
   a. planets. b. galaxies. c. stars. d. moons.
8. Our galaxy is called the ....
   a. Gemini. b. Milky Way. c. Scorpio. d. Ursa Major.
9. 📖 The telescope is used to study the ....
   a. minerals. b. earthquakes. c. celestial bodies. d. volcanoes.
10. 📖 In addition to the Sun, the solar system includes ....
    a. eight planets only.
    b. asteroids, meteorites and comets only.
    c. stars and planets.
    d. eight planets with the asteroids, meteorites and comets.
11. 📖 Planets revolve around the Sun in .... paths.
    a. circular b. elliptical c. spiral d. irregular
12. The number of planets revolving around the Sun is ....
    a. 5 b. 4 c. 8 d. 9

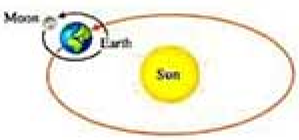
13. The nearest two planets to the Earth are …………
   a. Mercury and Venus.   b. Venus and Mars.
   c. Mars and Jupiter.   d. Mars and Mercury.
14. The nearest planet to the Sun is …………
   a. Earth.   b. Mercury.   c. Neptune.   d. Jupiter.
15. The farthest planet from the Sun in the solar system is …………
   a. Neptune.   b. Uranus.   c. Mercury.   d. Venus.
16. The number of inner planets is …………
   a. three.   b. four.   c. five.   d. nine.
17. The nearest outer planet to the Sun is …………
   a. Jupiter.   b. Uranus.   c. Neptune.   d. Saturn.
18. The outer planets formed of several elements, the most important of them are hydrogen and helium in ………… state.
   a. gaseous   b. liquid   c. solidified   d. molten
19. The big-sized, less dense planet, which consists of gaseous elements is the …………
   a. Earth.   b. Mercury.   c. Jupiter.   d. Venus.
20. ………… are gaseous planets.
   a. Mercury and Earth   b. Venus and Mars
   c. Venus and Earth   d. Uranus and Neptune
21. All of the following are among the outer planets except …………
   a. Mars.   b. Jupiter.   c. Uranus.   d. Neptune.
22. All of the following are among the inner planets except …………
   a. Saturn.   b. Mars.   c. Earth.   d. Mercury.
23. The densities of inner planets ranging between ………… gm/cm^3.
   a. 3.3 to 1.3   b. 3.3 to 5.5   c. 0.7 to 1.3   d. 0.7 to 5.5
24. ………… are among the characteristics of outer planets.
   a. High pressure and high temperature
   b. High pressure and extreme coldness
   c. Low pressure and high temperature
   d. Low pressure and extreme coldness
25. ………… is the scientist who proved the presence of attraction force between any two objects in the space.
   a. Galileo   b. Isaac Newton   c. Max Planck   d. Einstien
26. Which of the following planets has the largest gravity on its surface ? …………
   a. Mars.   b. Mercury.   c. Venus.   d. Earth.
27. The followers of the planets are called …………
   a. stars.   b. spaceships.   c. moons.   d. comets.

28. The figure .... represents the relation between the Sun, the Earth and the Moon.

a.


b.


c.


d.


29. The planet which has the greatest number of moons revolving around it is ....
a. Saturn. b. Jupiter. c. Uranus. d. Neptune.

30. Mars has .... moon(s).
a. one b. two c. three d. four

31. The sum of the numbers of moons of planets of the solar system equals .... moons.
a. 60 b. 62 c. 80 d. 164

32. .... are rocky bodies of variable sizes and irregular shapes situated between Mars and Jupiter planets.
a. Moons b. Galaxies c. Asteroids d. Comets

33. .... separates between the outer planets and the inner planets.
a. Meteor's region b. Asteroids' belt
c. Comets' belt d. Meteorite

34. The shooting lines seen at clear nights are called ....
a. comets. b. meteors. c. meteoroids. d. meteorites.

35. .... are huge rocky masses that fall from the space and reach the Earth's surface.
a. Meteorites b. Comets c. Asteroids d. Meteors

36. The mass of the biggest meteorite found up till now reaches .... tons.
a. 100 b. 80 c. 50 d. 10

37. Comets, asteroids and meteors revolve around the ....
a. Earth. b. Moon. c. Sun. d. Jupiter.

38. Comets revolve around the Sun in fixed .... orbits.
a. circular b. elliptical c. curved d. square

39. The comet consists of ....
a. frozen gas only. b. ice only.
c. rocky parts only. d. rocky and icy particles and water.

40. The head of the comet consists of a mixture of solidified gases, which are .... gases.
a. oxygen, nitrogen and carbon dioxide
b. hydrogen, helium and methane
c. oxygen, helium and nitrogen
d. carbon dioxide, nitrogen and methane

41. .... comet is the most famous one.
a. Galileo's b. Halley's c. Newton's d. Nobel's

42. Halley's comet completes its orbit around the Sun each ....
a. 68 years. b. 76 years. c. 76 months. d. 21 years.

UNIT 3

2. (A) Choose from column (B) what suits it in column (A) :

1

(A)	(B)
1. Galaxy	a. measures the distances between stars.
2. Light year	b. is the greatest universe unit.
3. Telescope	c. separates the outer planets from the inner planets.
4. The belt of the wanderer asteroids	d. explores the space.

2

(A)	(B)
1. The nearest planet to the Sun.	a. Jupiter
2. The farthest planet from the Sun.	b. Mars
3. The fourth planet away from the Sun.	c. The Sun
4. The planet, whose gravitational force on its surface is 7.77 m/sec^2.	d. Earth
5. The biggest planet in the solar system.	e. Mercury
6. The planet which has one moon revolves around it.	f. Neptune
	g. Uranus
	h. Venus

(B) Choose from columns (B) and (C) what suit it in column (A) :

(A)	(B)	(C)
1. Stars	a. Different sized rocky masses.	A. emit large amounts of heat and light.
2. Asteroids	b. Big-sized bodies.	B. have moons rotate around them.
3. Meteorites	c. Large rocky masses.	C. orbit the Sun in elongated elliptical orbits.
4. Comets	d. Masses of rocks, ice and solidified gases.	D. rotate between Mars and Jupiter.
	e. Small rocky masses.	E. fall on the Earth's surface.

3. Put (✓) or (✗) in front of the following statements and correct the wrong ones :

1. The stars, planets and moons are celestial bodies. ( )
2. The celestial bodies are in a permanent motion according to the will of Allah. ( )
3. The Milky Way galaxy takes an oval shape with straight arms. ( )
4. Reflecting and refracting microscopes are used for identifying the celestial bodies. ( )
5. The Sun is our planet in the solar system. ( )
6. There are eight spherical lightened planets revolve around the Sun. ( )
7. The paths of planets lie on one plane perpendicular to the Sun's axis of rotation around itself. ( )
8. The small or inner planets are Mercury, Venus, Earth and Saturn. ( )

9. The densities of the small planets are high ranging between 0.7 to 1.3 gm/cm^3. ( )
10. Inner planets are solid bodies. ( )
11. The number of moons of the inner planets equals 3 moons. ( )
12. The Earth is the third planet according to the distance from the Sun. ( )
13. The biggest planet in the solar system is Jupiter. ( )
14. Venus is the seventh planet according to its distance from the Sun. ( )
15. Jupiter is nearer to the Earth than Uranus. ( )
16. The outer planets are composed of rocks and they are relatively small in size. ( )
17. Jupiter, Uranus and Neptune are giant planets. ( )
18. The acceleration due to gravity on the surface of Neptune is 9.05 m/sec^2. ( )
19. Jupiter is the planet which has the largest number of moons revolving around it. ( )
20. Acceleration due to gravity on Saturn planet is the largest. ( )
21. Asteroids' belt is located between the orbits of Jupiter and Venus. ( )
22. Asteroids are the shooting lines seen at clear nights. ( )
23. Comets revolve around the Sun in fixed circular orbits. ( )
24. Asteroids consist of two parts, the head and the tail. ( )
25. Halley's comet appears every 67 years. ( )
26. The head of the comet is considered icy spheres, while its tail is considered a gaseous cloud. ( )

4. Write the scientific term of each of the following :

1. Any body swims in the space as stars, planets, moons, rocky and gaseous bodies.
2. Large bodies seem as points in the sky emitting enormous amounts of heat and light.
3. The distance covered by light in one year.
4. • The greatest unit which forms the universe.
   • A system that consists of thousands of millions of stars.
5. The galaxy which our solar system belongs to.
6. Eight spherical opaque bodies that revolve around the Sun in elliptical orbits.
7. The star of our solar system.
8. • The nearest four planets to the Sun.
   • A group of planets that have high density and smaller volumes than the others.
   • The group of planets in the solar system, that consist mainly of rocks and have small sizes.
9. • The farthest four planets from the Sun.
   • The group of planets in the solar system, that consist mainly of gases and have huge sizes.
10. • An inner planet has no atmosphere.
    • The nearest planet to the Sun.
11. Inner planets have no moons.
12. • One of the eight planets, that revolve around the Sun and it is the third planet far from the Sun.
    • The inner planet that has one moon revolves around it.

13. • The biggest planet in the solar system.
    • The planet which has the largest acceleration due to gravity on its surface.
    • The outer planet which has the largest number of moons revolves around it.
14. • The planet which has the least acceleration due to gravity on its surface.
    • The inner planet that has two moons revolve around it.
15. 📖 Small space bodies that are affected by the planets'gravity.
16. • Thousands of different sized rocky masses, which rotate between the orbits of Mars and Jupiter.
    • Space objects belong to the solar system and they are located between the inner planets and the outer planets.
17. The region which separates between the inner and the outer planets.
18. • Luminous lines which are formed in the sky due to completely burning of small rocky masses in the Earth's atmosphere.
    • Small rocky masses that burn up completely in the Earth's atmosphere.
19. • Celestial bodies of huge solid rocky masses that do not burn up completely when they penetrate the atmosphere and fall on the Earth's surface.
    • 📖 Rocky masses that fall from the space and reach the Earth's surface.
20. • Gaseous bodies formed of a head and a tail and revolve around the Sun in elliptical orbits.
    • 📖 Solidified masses of ice, gases and rock pieces revolve around the Sun.
21. The most famous comet which completes its revolution around the Sun each 76 years.

5. Complete the following statements :

1. Any body swims in the space is called ....
2. .... are large round bodies generating large amounts of heat and light.
3. The distance covered by the light in one year is called ....
4. The galaxy that our solar system belongs to is called .... or the Way of ....
5. The types of telescopes are .... and .... telescopes.
6. Telescopes are used for identifying the ....
7. The star of our solar system is the ....
8. The solar system includes .... , ... , moons, meteors, ... , ... and comets.
9. The number of planets that revolve around the Sun is ....
10. 📖 Planets revolve around the Sun in .... orbits which lie in a plane .... on the Sun's axis of rotation.
11. Planets of the solar system are divided according to their distances from the Sun into two groups, which are .... and .... planets.
12. Planets are arranged according to their distances from the Sun as follows : .... , ... , Earth, ... , Jupiter, Saturn, ... and Neptune.
13. 📖 The nearest planet to the Sun is .... and the farthest one from the Sun is ....
14. 📖 The biggest planet in volume is .... and the highest one in density is ....

15. The Earth lies between ………… and ………… planets , while the ………… planet lies between Neptune and Saturn planets.
16. The inner planets are small bodies, so they are called ………… planets, while the outer planets are big, so they are called ………… planets.
17. Mercury, ………… , ………… and Mars are the inner planets.
18. ………… and ………… planets have no moons.
19. ………… planet is from the small planets and it has no atmosphere.
20. The giant planets are formed of gaseous elements, the most important of them are ………… and ………… gases.
21. 📖 The force of gravity between two objects depends on ………… and …………
22. The acceleration due to gravity is the largest on ………… planet, while it is the least on ………… planet.
23. ………… planet has 27 moons revolving around it, while ………… planet has 12 moons revolving around it.
24. The number of moons revolving around Jupiter is ………… , while that revolves around Mars is …………
25. The Moon is the follower of the …………
26. Asteroids are formed of …………, which rotate around the ………… in a certain region.
27. The belt of the wanderer asteroids separates between the orbits of ………… and ………… planets.
28. The luminous arrows, that can be seen in the sky at clear nights are called ………… , while the large rocky masses, that don't burn up completely and fall on the Earth are called …………
29. The comet consists of two parts, which are ………… and …………
30. The head of the comet consists of a mixture of solidified gases of carbon dioxide, ………… and ………… gases and other components.
31. Comets revolve around the Sun in fixed ………… orbits.
32. The most famous comet that the inhabitants of the Earth could observe is ………… and it completes its revolution around the Sun every ………… years.

6. Give reasons for :

1. • The stars seem as light points although they are huge.
   • The stars seem as very small light points in spite of their big sizes.
2. 📖 Astronomers do not measure the distances between stars in kilometres.
3. Planets revolve around the Sun in fixed orbits.
4. Mercury, Venus, Earth and Mars are called the inner planets.
5. The inner planets are called small planets.
6. The density of the inner planets is high.
7. Jupiter, Saturn, Uranus and Neptune are called the outer planets.
8. The outer planets are called giant planets.

9. The density of the outer planets is low.
10. The presence of hydrogen gas in a solidified state on the surface of outer planets.
11. The gravity on the Earth's surface is larger than that on Mars'surface.
12. The object weight is changed from a planet to another.
13. Moons are considered the followers of the planets.
14. Sometimes, we see some luminous lines in the sky at clear nights.
15. No one can see Halley's comet more than two times in his life.

7. Choose the odd word out, then mention the scientific name of the rest :

1. Mercury - Venus - Earth - Mars.
2. The Sun - Mars - Earth - Jupiter.
3. Mercury - Venus - Saturn - Earth - Mars.
4. Jupiter - Saturn - Uranus - Neptune - Venus.
5. Earth - Venus - Neptune - Halley.
6. Asteroids - Comets - Moons - Earthquakes.

8. What are the following numbers indicate... ?

1. 9.467×10^{12} km.
2. 8 planets.
3. 4 planets.
4. 3.3 to 5.5 gm/cm^3.
5. 0.7 to 1.3 gm/cm^3.
6. 60 moons.
7. 1 moon.
8. 3 moons.
9. 27 moons.
10. 62 moons.
11. 9.8 m/sec^2.
12. 22.88 m/sec^2.
13. 80 tons.
14. 76 years.

9. What is meant by ... ?

1. Celestial body.
2. Stars.
3. Light year.
4. The distance between two stars is 2 light years.
5. Galaxies.
6. Planets.
7. Inner planets.
8. Outer planets.
9. Moons.
10. Asteroids.
11. The belt of the wanderer asteroids.
12. Meteors.
13. Meteorites.
14. Comets.

10. What happens if ... ?

1. You look at the sky in a clear moonless night.
2. We can't invent the telescope.
3. The planet becomes nearer to the Sun.
4. Travelling from Earth planet to Mars planet (related to the attraction force).

5. • Several small asteroids penetrate the Earth's atmosphere.
 • Friction of meteors with Earth's atmosphere.
6. A large asteroid (meteorite) penetrates the Earth's atmosphere.

11. Compare between :

1. Stars, planets and moons.
2. Outer planets and inner planets.
3. Jupiter planet and Mars planet [according to : the distance from the Sun - the number of moons rotate around each of them].
4. 📖 Meteors and comets.
5. 📖 Asteroids and planets.
6. 📖 Meteors and meteorites.

12. Problems :

1. Calculate the distance in kilometre between the Sun and a star, if the distance between them equals 6 light years.
2. Calculate the distance in light year between two stars. If the distance between them equals 28.401×10^{12} km.

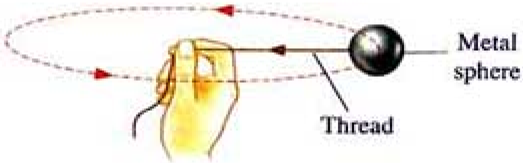
13. Variant questions :

1. Arrange the planets of the solar system ascendingly according to :
 1. Their distances from the Sun.
 2. The acceleration due to gravity on their surfaces.
2. What is the importance of telescopes ? Mention their types.
3. "Galaxy is a tremendous collection of stars" :
 1. What's the galaxy which our solar system belongs to ?
 2. What's the shape of our galaxy ?
 3. Where's the position of the Sun in our galaxy ?
4. What is the name of the star of our solar system? What is the number of planets rotating around it?
5. Mention the factors that affect the attraction force between two objects.
6. If you know that the last time for Halley's comet to appear was in 1986.
 1. When did it appear before 1986 ?
 2. When do you expect its appearance again ?
7. 📖 If you and your classmates made a trip in the space to the planet Mars, and played basketball game there. Is it easier for you to jump towards the basket and put the ball inside than playing on the Earth's surface ?
 Explain your answer in the light of your previous study.

14. Study the following figures, then answer the following questions :

1 From your previous study of the motion of the Sun and the rotation of the planets around it, complete the following :

1. The metal sphere represents ....
2. The hand represents ....
3. The thread represents ....
4. The path of the metal sphere represents ....



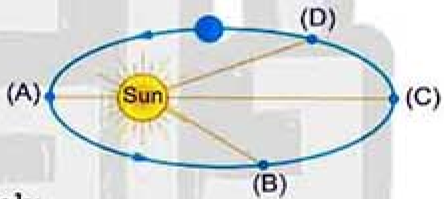
2 From the opposite figures, mention :

1. The name of each figure.
2. The importance of the figures.


Fig. (A) Fig. (B)

3 The opposite figure shows the path of one of the planets around the Sun.

1. What is the name of the path, in which the planet rotates and what is its shape ?
2. What is the name, which is given to the planet's satellite ?
3. Arrange these points (A , B , C and D) descendingly according to the effect of the central gravitational force of the Sun. Mention the effective factor.



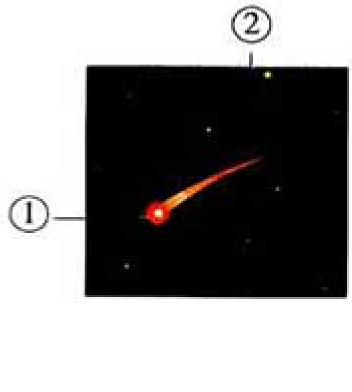
4 The opposite figure represents the galaxy that our solar system belongs to. Answer the following questions :

1. What is the name of this galaxy ?
2. From which, this galaxy consists of ?
3. Complete : Point (X) refers to ....



5 The opposite figure represents one of the components of the solar system :

1. What is expressed in the fig. ?
2. Write the labels ① and ②.



Timss Questions



1. Choose the correct answer :

1. The planets of the solar system are divided into two groups, which are inner planets and outer planets.

   (A) The Earth planet is one of the inner planets. Which of the following values represents the density of the Earth planet ? ....

   a. 0.9 gm/cm^3 b. 5.5 gm/cm^3 c. 1.3 gm/cm^3 d. 2.5 gm/cm^3

   (B) Jupiter planet is one of the outer planets. Which of the following values represents the density of an outer planet ? ....

   a. 3.3 gm/cm^3 b. 5.5 gm/cm^3 c. 4 gm/cm^3 d. 1.1 gm/cm^3

2. The mass of unit volume of Jupiter planet to the mass of unit volume of the Earth planet is .... one.

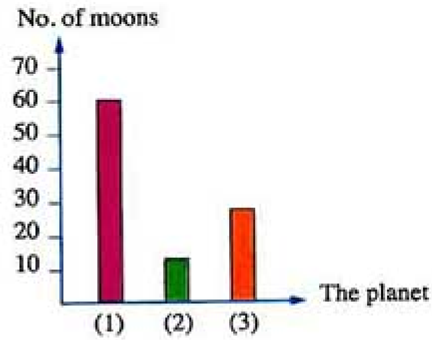
   a. less than b. more than c. equal to d. no correct answer

2. What happens if there is no force of attraction between the Sun and the planets ?

3. The scientist Halley can see the comet, which is known by his name in 1682 and its age in this time is 20 years and he died in 1743.

* If you think that he sees this comet again or no ? Give a reason.

4. The opposite graph represents the relation between the planet and the number of moons followed it.



Answer the following questions :

1. Mention the names of the planets (1) , (2) and (3).
2. Choose : The number of moons of planets Earth and Mars together is quarter the number of moons of .... planet. (1 - 2 - 3)

5. Mention the similarities between the solar system and the oxygen atom.

LESSON 2

The Earth



Why there is life on the Earth's surface ?

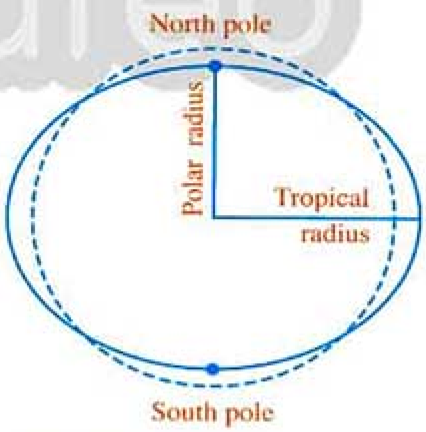
- *You have learned in the previous lesson that the Sun occupies the centre of the solar system and the Earth is one of the eight planets revolving around it.*
- *The Earth is the planet that we live on, so we will study it in detail.*

Description of the Earth

1 Earth's shape :

The Earth is a spherical object, which is about to be completely circular accompanied by :

- a slight flattening at the two poles.
- indented outward at the equator, ***where the tropical radius is about 22 km larger than the polar radius.***



GR.

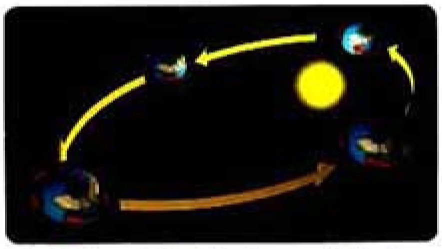
The tropical radius is larger than the polar radius.

Because the Earth is slightly flattened at its poles and indented outward at the equator.

2 Earth's rotation around the Sun :

- The Earth with the other planets revolve around the Sun by the action of gravity.

  The Earth completes one revolution around the Sun in 365.25 days.



Revolution of the Earth around the Sun

3 Earth's location related to the Sun :

- The Earth occupies the third position according to its distance from the Sun. (it is preceded by Mercury and Venus).

  The distance between the Sun and the Earth is about 150 million kilometres.

4 Earth's volume :

- Concerning the volume, the Earth occupies the medium position in the solar system GR. ***because it is the biggest inner planet and it is smaller than any planet from the outer planets.***
- It occupies the fourth order (ascendingly) regarding the volume.

  Its average radius is about 6386 km approximately.

5 Earth's mass :

- Earth's mass is considered as the biggest mass in the inner planets of the solar system.

  Its mass is 5.9×10^{24} kilograms.

Characteristics of the Earth that support the continuity of the life

1. Atmosphere.
2. Hydrosphere.
3. Suitable temperature.
4. Gravity.
5. Suitable atmospheric pressure.

1 Earth's atmosphere :

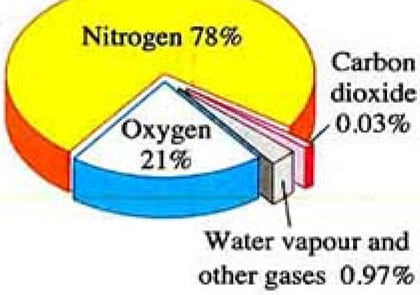
- The Earth is surrounded by **an atmosphere** as it appears like a white colour around the Earth in the picture captured from the Moon's surface.



The Earth

- The Earth's atmosphere consists of a group of different gases, the following table shows them :

	The components of the Earth's atmosphere	Percentage
1	Nitrogen gas.	78 %
2	Oxygen gas.	21 %
3	Carbon dioxide gas.	0.03 %
4	Water vapour.	Variable percentage
5	Other gases.	Very little percentage



NB The major component of the atmosphere is the nitrogen gas.

Importance of the Earth's atmosphere :

The gases of Earth's atmosphere have great importance in the continuity of life as follows :

A Importance of oxygen gas :
- It is used in respiration process of living organisms.
- It helps in combustion (burning) process of fuels.

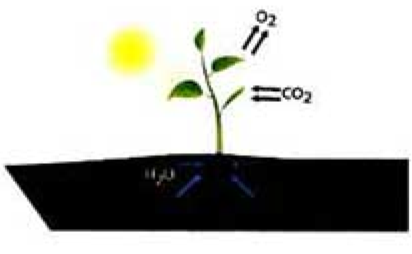


B Importance of nitrogen gas :
- It reduces the effect of oxygen gas during burning processes.
- Plants use it to form proteins.



C Importance of carbon dioxide gas :

It is used by green plants in photosynthesis process to form food for other living organisms including people.



2

The great expansion of atmosphere in the space helps in :

- Burning millions of small falling meteors completely before reaching the Earth's surface.



- Reducing the high speed of large meteorites and burning a part of them before they hit the Earth's surface.



3

The weather and climate phenomena take place in the atmosphere, such as :

- Wind movement.
- Clouds formation.
- Rain falling to complete the water cycle.



4

It participates in keeping the Earth's temperature suitable for life.



5

It contains ozone layer, which protects living organisms from the harmful ultraviolet rays.



What will happen if ?

- Absence of ozone layer in the atmosphere.
  - The ultraviolet rays will reach the Earth's surface and harm living organisms.
- There is no atmosphere.
  - There will be no life on the Earth's surface and its surface is exposed to destruction due to falling of space bodies on it easily.

TRY TO ANSWER worksheet **17** in the Notebook

UNIT 3

2 Earth's hydrosphere :



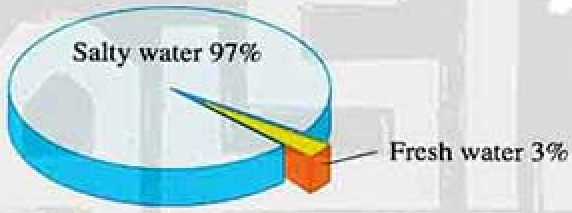
The following table shows what the blue and green colours in the opposite natural map of the Earth's surface represent and what is the percentage of each of them in proportion to the Earth?

Colour	Represent		Percentage
Blue	**Water bodies**, such as : - Oceans. - Lakes.	- Seas. - Rivers.	About 71%
Green	**Land**, such as : - Mountains. - Valleys.	- Plains. - Islands.	About 29%



➲ **Water is divided into :**

A Salty water | **B Fresh water**



It represents

A Salty water	B Fresh water
• 97% of water area on the Earth's surface.	• 3% of the water area on the Earth's surface.

It exists in

A Salty water	B Fresh water
• Oceans. • Seas.	• Rivers. • Lakes. • Snow at the two poles. • Ground water in the pores and cracks of the rocks that form the solid mass of the Earth.

Importance of hydrosphere

1. Water is necessary for the life of all living organisms (plants, animals and human), where :

* Plants use it in photosynthesis process to form food.
* Man and animal benefit from it in completing food digestion and absorption processes in the digestive system.
* It shares in blood formation.
* It keeps the constancy of body temperature.

2. It keeps the temperature on land during day and night within the proper limits of living organisms.

3. It represents a suitable environment for large numbers of living organisms, where more than 50% of known living organisms live in the aquatic environments.

3 Suitable temperature :

The temperature on the Earth's surface is suitable for the continuity of life of living organisms at day and night GR

Due to the presence of the Earth in the third position according to its distance from the Sun.

4 Gravity :

The Earth has the force of gravity that makes the life continues through :

1. Constancy and steadfastness of objects and living organisms on its surface.
2. Steadfastness of the hydrosphere position on its surface.
3. Keeping the Earth surrounded by the atmosphere.

5 Suitable atmospheric pressure :

The Earth is characterized by the presence of suitable atmospheric pressure (air pressure) of about 76 cm.Hg, this pressure suits the continuity of life on the Earth's surface.

GR

The planet Earth is suitable for life.

Due to : - The presence of water.
- The presence of the atmospheric envelope containing oxygen gas, which is needed for life.
- Its temperature is suitable during both day and night.
- Its atmospheric pressure and its gravitational force are suitable.

The inner structure of the Earth

- Scientists think that the inner part of the Earth was in a molten form at its origin GR ***due to the high temperature.***
- As a result of the revolution of the Earth around its centre :

* The heaviest metals **(iron and nickel)** descended towards the centre.

* The lightest components in density ascended upwards.

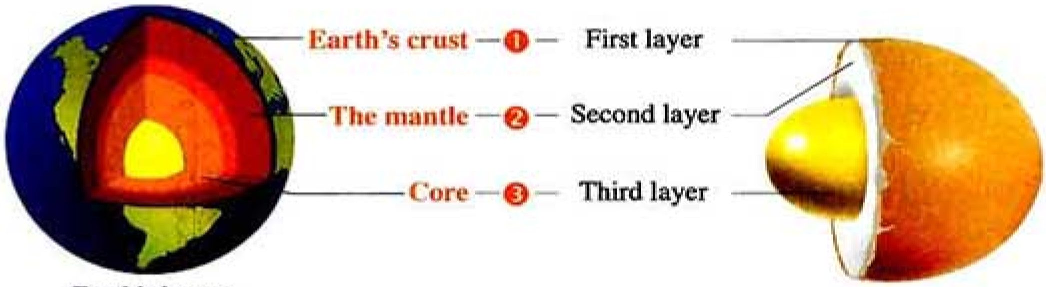
- This led to the formation of a number of layers. Each layer has its own characteristics that distinguish it from the others.



Rotation of the Earth around its centre leads to the formation of Earth's layers.

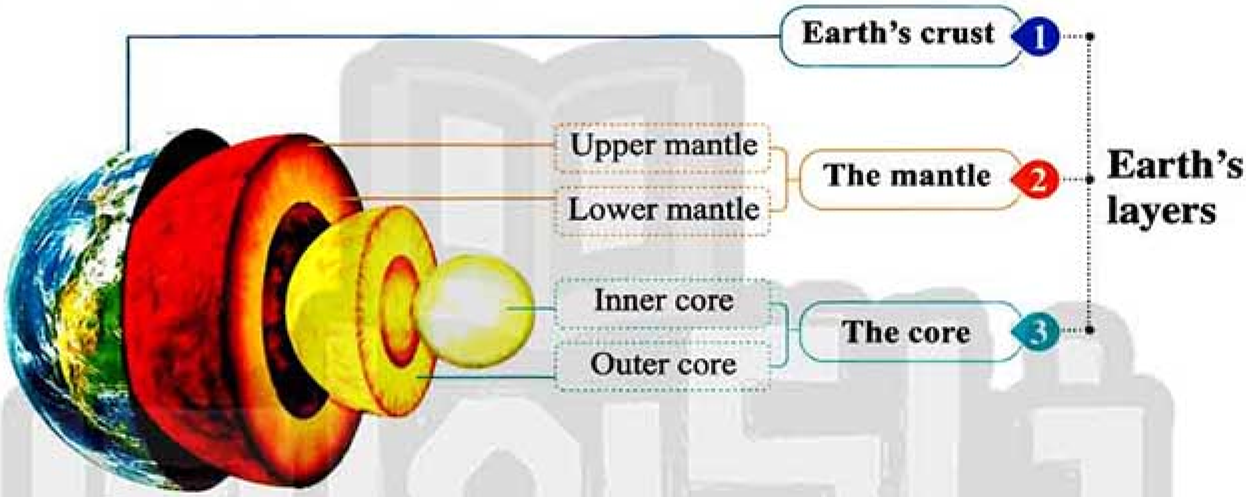
UNIT 3

- The Earth (as the egg) consists of three layers arranged from outside to inside as follows :



Earth's layers

The following figure and diagram show the layers of Earth :



Earth's layers



Earth's layers		Formation	Thickness
Earth's crust (The first layer)		It is a relatively light outer layer.	Ranges between 8-60 km approximately.
The mantle (The second layer)		It is a rocky layer.	About 2885 km approximately.
The core (The third layer)	Outer core	It is a layer of molten metals.	About 2100 km approximately.
	Inner core	It is solid layer rich in iron and nickel.	Its radius is about 1350 km approximately.

GR.

The Earth's inner core is rich in iron and nickel.

Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

TRY TO ANSWER worksheets in the Notebook **18 & 19**

Remember

- The Earth completes one revolution around the Sun in 365.25 days.
- The distance between the Sun and the Earth is about 150 million kilometres.
- The tropical radius of the Earth is about 22 km larger than the polar radius.
- The average radius of Earth is about 6386 km approximately.
- The Earth's mass is 5.9×10^{24} kilograms.

Characteristics of the Earth that support the continuity of the life :

1. Atmosphere
2. Hydrosphere
3. Suitable temperature
4. Gravity
5. Suitable atmospheric pressure

The Earth's atmosphere consists of :

A) Oxygen gas :

- Its percentage is 21 % of air volume.
- It is used in respiration process of living organisms.
- It helps in combustion (burning) process of fuels.

B) Nitrogen gas :

- Its percentage is 78 % of air volume.
- It reduces the effect of oxygen gas during burning processes.
- Plants use it to form proteins.

C) Carbon dioxide gas :

- Its percentage is 0.03 % of air volume.
- It is used by green plants in photosynthesis process to form food for other living organisms.

D) Water vapour : Variable percentage.

E) Other gases : Very little percentage.

Importance of the Earth's atmosphere :

- The great expansion of atmosphere in the space helps in :
  - Burning millions of small falling meteors completely before reaching the Earth's surface.
  - Reducing the high speed of large meteorites and burning a part of them before they hit the Earth's surface.
- The weather and climate phenomena take place in the atmosphere, such as :
  - Wind movement. - Clouds formation.
  - Rain falling to complete the water cycle.
- It participates in keeping the Earth's temperature suitable for life.
- It contains ozone layer which protects living organisms from the harmful ultraviolet rays.

- Water covers about 71 % of the Earth's surface, while land covers about 29 % of the Earth's surface.
- Salty water represents 97 % of the total volume of water, while fresh water represents 3 % of it.
- The normal atmospheric pressure on Earth's surface is about 76 cm.Hg.
- The Earth consists of three layers arranged from outside to inside as follows :
  1. Earth's crust. 2. The mantle. 3. The core.

Questions on lesson two

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. The Earth completes one revolution around the Sun in .... days.
   a. 24 b. 365.25 c. 150 d. 60
2. The Earth is preceded by ....
   a. Mercury and Venus. b. Venus and Mars.
   c. Jupiter and Mars. d. Mercury and Mars.
3. 📖 The Earth is located in the solar system regarding its distance from the Sun in the .... order.
   a. third b. fourth c. fifth d. seventh
4. 📖 Regarding the volume, the Earth occupies the .... order (ascendingly) in the solar system.
   a. third b. fourth c. fifth d. eighth
5. All of the following are among the characteristics supporting the continuity of life on the Earth except ....
   a. atmosphere. b. temperature.
   c. gravity. d. electromagnetic force.
6. The percentage of oxygen gas in the atmospheric air is ....
   a. 0.03 % b. 78 % c. 87 % d. 21 %
7. The most abundant gas in the atmospheric air is .... gas.
   a. oxygen b. carbon dioxide c. nitrogen d. hydrogen
8. Which of the following gases is not considered among the air components ? ....
   a. Oxygen. b. Nitrogen. c. Carbon dioxide. d. Sulphur dioxide.
9. .... gas reduces the effect of oxygen gas during combustion processes.
   a. Carbon dioxide b. Nitrogen
   c. Hydrogen d. Carbon monoxide
10. The percentage of water vapour in air is ....
    a. 21 % b. 0.13 % c. not stable d. 0.03 %
11. The great expansion of atmosphere in space helps in ....
    a. burning the small rocky masses before reaching the Earth's surface.
    b. reducing the high speed of large meteorites.
    c. formation of clouds.
    d. (a) and (b) are correct.
12. Ozone layer protects life on the Earth by absorbing .... rays.
    a. infrared b. visible c. invisible d. ultraviolet

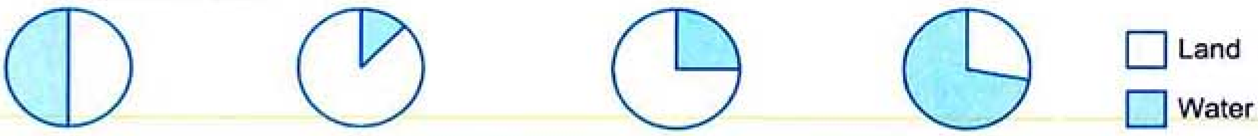
13. 📖 Water masses on the Earth's surface form about ....

a. 30 % b. 50 % c. 71 % d. 90 %

14. Fresh water represents about .... of the total volume of water.

a. 0.3 % b. 3 % c. 70 % d. 97 %

15. The figure that represents the amount of water compared with the area of Earth's surface is ....



a. b. c. d.

16. .... is among sources of salty water.

a. Snow at the two poles
b. Ocean
c. River
d. Ground water

17. More than .... of known living organisms live in the aquatic environments.

a. 25% b. 50% c. 10% d. 75%

18. The Earth is characterized by the presence of suitable .... of about 76 cm.Hg.

a. gravity b. temperature c. air pressure d. hydrosphere

19. The Earth's layers are arranged from outside to inside as follows ....

a. crust, core and mantle.
b. mantle, crust and core.
c. crust, mantle and core.
d. core, mantle and crust.

20. The inner layer of the Earth is called the ....

a. mantle. b. crust. c. core. d. pole.

21. The outer layer of the Earth is called ....

a. crust. b. mantle. c. inner core. d. outer core.

22. The thickness of the mantle layer is about .... kms.

a. 2250 b. 2900 c. 2885 d. 2270

23. The layer which consists of molten metals is the ....

a. crust. b. mantle. c. outer core. d. inner core.

24. The Earth's inner core contains .... in a solid state.

a. iron and copper
b. nickel and copper
c. iron and nickel
d. copper and aluminium

25. The outer core of the Earth exists in .... state.

a. solid b. gaseous c. liquid d. molten

26. The radius of the inner core is about .... km approximately.

a. 50 b. 1350 c. 2100 d. 2885

27. .... is the smallest Earth's layer in thickness.

a. Crust b. Inner core c. Mantle d. Outer core

2. Choose from column (B) what suits it in column (A) :

1

(A)	(B)
1. Atmospheric pressure on the Earth's surface	a. an outer light layer, its thickness ranging between 8 - 60 km.
2. The Earth's crust	b. helps in the steadfastness of the atmosphere and hydrosphere on its surface.
3. The Earth occupies in the solar system	c. is about 76 cm.Hg.
4. The force of Earth's gravity	d. third position in view of the distance from the Sun.
	e. is rich in iron and nickel.

2

(A)	(B)
1. Carbon dioxide gas	a. forms about 21% of the air volume.
2. Nitrogen gas	b. forms about 0.97% of the air volume.
3. Oxygen gas	c. forms about 78 % of the air volume.
4. Water vapour	d. forms about 0.03% of the air volume.
	e. percentage is unstable.

3

(A)	(B)
1. The Earth's crust	a. contains molten metals.
2. The mantle	b. contains ozone layer.
3. The outer core	c. contains iron and nickel in a solid state.
4. The inner core	d. has thickness that is ranging between 8 - 60 kms.
	e. is a rocky layer.

3. Put (✓) or (✗), then correct the wrong one :

1. The Earth is a spherical object. ( )
2. Earth's radius between the two poles is larger than that at the equator. ( )
3. The Earth is the third planet according to the distance among the Sun. ( )
4. The Earth is considered as the biggest mass in the inner planets of the solar system. ( )
5. Surrounding the Earth by an atmospheric envelope is among the characteristics supporting the continuity of life on the Earth. ( )
6. The atmospheric air is a compound of different gases with the same ratios. ( )
7. The percentage of water vapour in air is 0.03 % ( )
8. Oxygen gas lessens the effect of nitrogen gas during combustion processes. ( )
9. The speed of meteorites increases on friction with air atmospheric molecules. ( )

10. The percentage of oxygen gas in air is more than the percentage of nitrogen gas and is less than the percentage of carbon dioxide gas. ( )
11. Green plants use carbon dioxide gas in photosynthesis process. ( )
12. Hydrogen gas is used by plants to form proteins. ( )
13. Ozone layer protects the living organisms from the harmful infrared rays. ( )
14. Water covers about 50 % of the Earth's surface. ( )
15. The blue colour on the Earth represents the land area. ( )
16. Salty water represents about 3 % of the total volume of water. ( )
17. The water of oceans is fresh water. ( )
18. Water keeps the body temperature constant. ( )
19. The steadfastness of the hydrosphere position on the Earth's surface is due to the suitable pressure. ( )
20. Air pressure on the Earth's surface is suitable for continuity of life. ( )
21. The atmospheric pressure on the Earth's surface is 76 cm.Hg. ( )
22. Mantle layer lies beneath the Earth's outer core. ( )
23. The Earth's inner core is rich in iron and nickel. ( )
24. The outer layer of the Earth is known as the mantle. ( )
25. The Earth's core is formed of two layers, a molten outer core and a solid inner core. ( )
26. The molten metals are found above the layer of Earth's inner core. ( )

4. Write the scientific term of each of the following :

1. • The biggest inner planet.
   • The planet which occupies the third position according to the distance from the Sun.
   • The planet which occupies the fourth position according to the volume.
2. An envelope that surrounds the Earth and consists of a group of different gases.
3. A gas that helps in burning processes.
4. • The most abundant gas in air.
   • A gas that reduces the effect of oxygen gas during burning processes.
5. A gas that is used by green plants in photosynthesis.
6. A process by which the plant makes its food.
7. The layer of atmosphere, which protects the Earth and living organisms from the harmful ultraviolet radiations.
8. It exists in the pores and cracks of rocks that form the Earth's mass.
9. A colourless liquid, the plant uses it in photosynthesis process and the human benefits from it in completing food digestion.

10. • It is relatively light outer layer of the Earth, its thickness is ranging between 8 - 60 km.
    • The outer layer of the Earth.
11. • The layer of the Earth just beneath the Earth's crust and its thickness is about 2885 km.
    • The middle layer of the Earth's layers.
12. The layer of the Earth, which is rich in iron and nickel.
13. A layer of molten metals with a thickness 2100 km.

5. Complete the following statements :

1. The Earth revolves around the Sun by the action of .... to complete one revolution around the Sun in .... days.
2. The Earth occupies the .... position according to the distance from the Sun, where it's far from the Sun about .... km.
3. The Earth's shape is to be completely circular accompanied with .... at the two poles and .... at the equator.
4. The .... radius of the Earth is about 22 km larger than the .... radius.
5. Concerning the volume, the Earth is the biggest .... planet.
6. The average radius of the Earth is about .... , while its mass is ....
7. 📖 The planet Earth occupies the .... position in the solar system in view of the volume, regarding the density it occupies the .... position, and concerning the acceleration due to gravity on its surface it occupies the .... position.
8. .... and .... are among the characteristics of the Earth supporting the continuity of life.
9. The atmospheric envelope appears as a .... colour around the Earth.
10. The percentage of carbon dioxide gas in the atmospheric air is .... , while the percentage of oxygen gas is ....
11. The major component of the atmosphere is .... gas and it occupies about .... of the air volume.
12. 📖 Green plants use .... gas in photosynthesis process.
13. .... gas is used in combustion processes of fuels, while .... gas is used by plants to form proteins.
14. .... gas controls the effect of oxygen gas during combustion processes.
15. The .... layer in the atmospheric air protects living organisms from harmful rays.
16. .... , ... and rain falling are from the weather and climate phenomena.
17. The great expansion of atmosphere in the space helps in .... and ....
18. Water covers about .... of the Earth's surface, 97% of it is .... water, and 3% of it is .... water.

19. .... and .... are among the sources of fresh water, while .... and .... are among the sources of salty water.
20. Ground water exists in the .... of the rocks that form the Earth's mass.
21. .... shares in blood formation and stablizing the body ....
22. The normal atmospheric pressure on the Earth's surface is about ....
23. The Earth consists of a number of arranged layers from the surface to the centre : The crust, ... and ....
24. The outer layer of the Earth is called .... and the next one is called ....
25. .... is the smallest Earth's layer in thickness, while .... is the biggest Earth's layer in thickness.
26. The thickness of the Earth's crust ranges from .... to ....
27. The Earth's core is divided into .... core and .... core.
28. .... and .... are among heavy metals that are collected around the centre of the Earth.

6. Give reasons for each of the following :

1. The tropical radius is larger than the polar radius.
2. Concerning the volume, the Earth occupies the medium position in the solar system.
3. The presence of a white colour surrounds the Earth.
4. Some rocky masses that fall from the space don't reach the Earth's surface.
5. Importance of ozone layer.
6. Temperature on the Earth's surface suits the life of living organisms.
7. Steadfastness of the hydrosphere on the Earth's surface.
8. Keeping the Earth surrounded by the atmosphere.
9. The presence of life on the surface of Earth planet only.
10. Earth's gravity makes life continue.
11. The Earth consists of many layers, each layer has its own characteristics.
12. Scientists think that the inner part of the Earth was in a molten form.
13. • The Earth's inner core is rich in iron and nickel.
    • Iron and nickel elements are collected around the centre of the Earth.

7. What is the number indicating each of the following :

1. The difference between the tropical radius and the polar radius.
2. The periodic time for rotation of the Earth around the Sun.
3. The distance between the Sun and the Earth.
4. The average radius of the Earth.

5. The average mass of the Earth.
6. The percentage of nitrogen gas in the atmospheric air.
7. The percentage of oxygen gas in the atmospheric air.
8. The percentage of carbon dioxide gas in the atmospheric air.
9. The percentage of water bodies concerning the area of Earth's surface.
10. The percentage of salty water concerning the area of water bodies.
11. The percentage of fresh water concerning the area of water bodies.
12. The normal air pressure.
13. The thickness of the Earth's crust.
14. The thickness of the mantle layer.
15. The thickness of the outer core of the Earth.
16. The thickness of the inner core of the Earth.
17. The thickness of the core of the Earth.

8. What is the importance of :

1. Oxygen gas.
2. Nitrogen gas.
3. Carbon dioxide gas.
4. The atmosphere [related to the protection of Earth from space rocks].
5. The atmosphere [related to the temperature of Earth].
6. Ozone layer.
7. Water in continuity of life on the Earth (three points only).
8. Gravity in continuity of life on the Earth.
9. The Earth is located in the middle position related to the Sun.

9. What do you expect in the following cases .... ?

1. The air contains oxygen gas and is free of nitrogen gas.
2. There is no atmosphere.
3. Absence of ozone layer in the atmosphere.
4. The Earth loses its gravity.

10. Compare between :

1. Oxygen, nitrogen and carbon dioxide gases.
   [Concerning : The percentage of the presence of them in the air - Importance].
2. Nitrogen and carbon dioxide gases [Concerning : The importance of each of them for plants].
3. Water bodies and land on the Earth's surface.
4. Salty water and fresh water.

5. The crust and the mantle.
6. Inner core and outer core.

11. Variant questions :

1 **Describe the planet Earth through :**

1. Its shape.
2. Its volume.
3. Its mass.
4. The time of rotation around the Sun.

2 **Mention the characteristics supporting the continuity of life on the planet Earth.**

3 **Explain with drawing the inner structure of the Earth.**

4 **Arrange :**

1. The components of atmospheric air descendingly concerning the percentage of their presence.
2. The following Earth's layers from inside to outside.
(Lower mantle - Crust - Inner core - Upper mantle - Outer core).

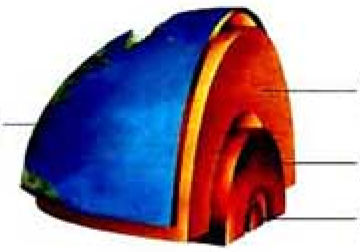
12. Study the following figures, then answer the questions :

1 **In front of you, a part of a boiled egg. The contents of that egg is similar to the Earth's layers, where :**



1. The yolk (yellow part of the egg) represents ....
2. The white part of the egg represents ....
3. The shell of the egg represents ....

2 **Look at the opposite figure, which represents a section in the Earth, then answer the following questions :**



1. Label the numbered items.
2. Molten metals are found in layer number ....
3. The thickness of layer number (3) is about .... , while that of layer number (4) is about ....
4. The layer number (4) contains iron and .... in a .... state.

Timss Questions

1. Choose the correct answer :

1. The ratio of the blue colour to that of the green colour in the world natural map of the Earth's surface is .... one.

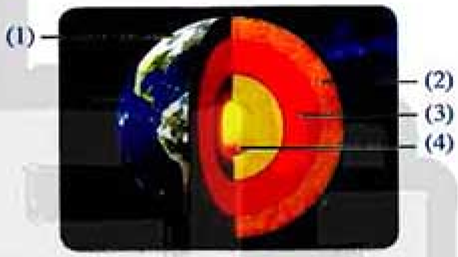
   a. more than b. less than c. equal to d. no correct answer

2. The ratio between the density of the Earth's core to that of the Earth's crust is .... one.

   a. more than b. less than c. equal to d. no correct answer

3. The Earth consists of four layers as in the opposite figure. From which the layer no. (2) is formed ? ....

   a. A solid rock.
   b. A solid metal.
   c. A molten rock.
   d. A liquid metal.

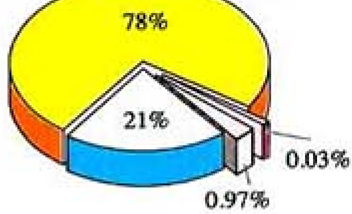


2. What do you expect in the following cases if .....?

1. The Earth's atmosphere doesn't contain oxygen gas.
2. The air pressure increases more than 76 cm.Hg.

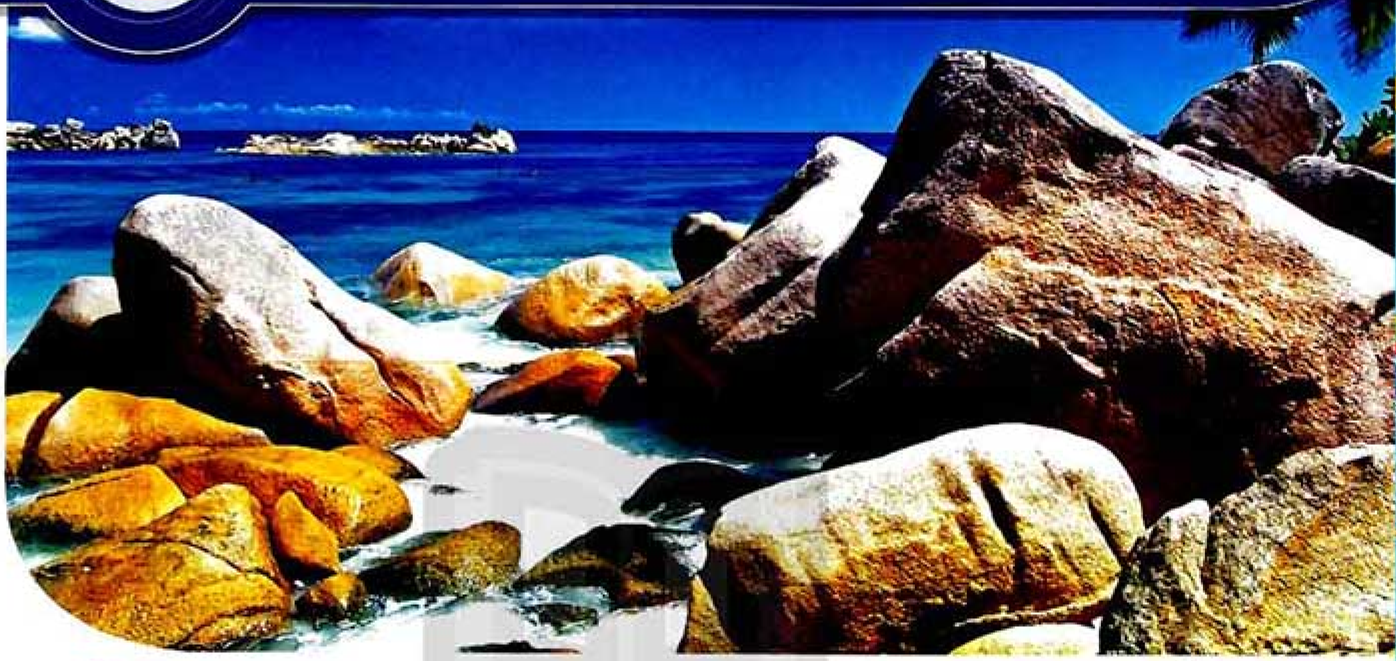
3. The opposite figure represents the percentage of gases formed the atmosphere. Mention :

1. The name of these gases according to the percentages presented on the figure.
2. The importance of the gas whose percentage is 78% for living organisms.



LESSON 3

Rocks and Minerals



What
are the types of rocks that present in the Earth's crust ?

- *From the previous lesson, you know that :*
  - *The Earth consists of three layers.*
  - *The outer layer is called the Earth's crust.*
- *Scientists classified the Earth's crust into two main parts which are :*
  1. The soil. *2. The solid basis.*



The structure of the Earth's crust

Components of the Earth's crust

1 The soil

2 The solid basis

Soil

It is a thin non-compacted layer, which covers the Earth's crust.

- It is superficial (upper) layer of the Earth's crust.
- It is a thin, fragmented and loosened layer.
- It consists of a mixture of mineralogical substances, water, air, decayed organic materials and plant roots.

Rock

It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.

- It is lower layer of the Earth's crust beneath the soil.
- It consists of different types of rocks.

GR.

The plant roots extend easily through the upper part of the Earth's crust but can't extend through its lower part.

Because the upper part is fragmented and loosened layer but the lower part is a solid material, that consists of different types of rocks.

Classification of rocks

Rocks are classified according to their way of formation into three groups, the following diagram shows them :

Types of rocks

- **Igneous rocks**
- **Sedimentary rocks**
- **Metamorphic rocks**

First The igneous rocks

- You knew from the previous lesson, the outer core of the Earth contains molten metals, which are known as magma.

Magma

It is a very hot thick (viscous) liquid underneath the Earth's crust.

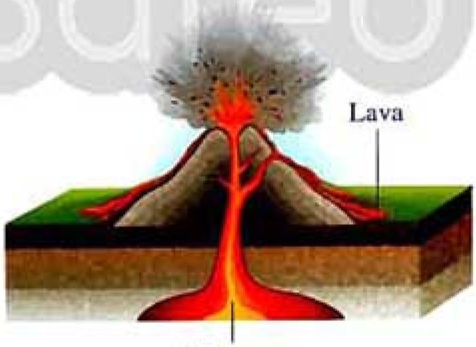
- When a volcano occurs, the magma at the bottom of the Earth's crust is pushing upwards.
- A part that fill's some gaps and cracks of the Earth's crust and the other part is extruded from the crater of volcano to the surface of the Earth in the form of volcanic flows, which is known as lava.

Lava

- It is the magma when it reaches the Earth's surface.

Or

- It is the volcanic flows that spread on the volcanic sides.



- When magma and lava cool and solidify, they form the igneous rocks.

Igneous rocks

They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.

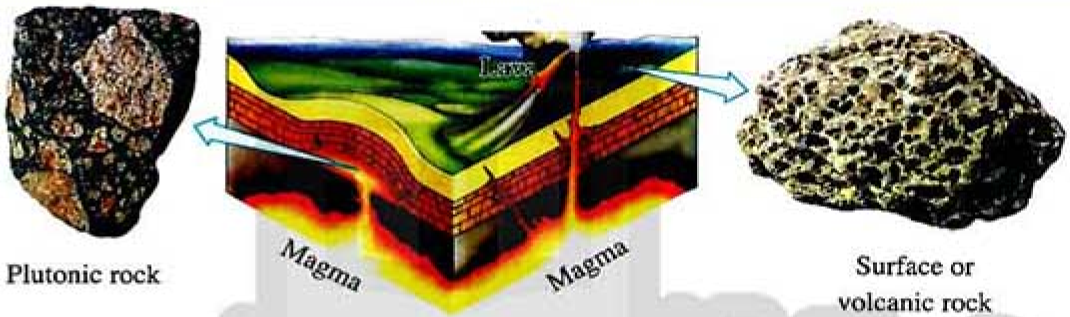
UNIT 3

Types of igneous rocks

Igneous rocks can be divided according to the site (place) of their formation in proportion to the Earth's surface into two main divisions, which are :

1. **Plutonic rocks.**
2. **Surface or volcanic rocks.**

1 Plutonic rocks	2 Surface or volcanic rocks



Plutonic rock — Surface or volcanic rock

Ways of formation

Plutonic rocks	Surface or volcanic rocks
The magma at the depths of the Earth's crust gets **cool slowly**, therefore the minerals that form these rocks take a **long time** to crystallize, so their crystals are **large-sized**.	The lava **cools quickly** on the surface of the Earth's crust, therefore the minerals that form these rocks take a **short time** to crystallize, so their crystals are **small-sized**.

Texture

Plutonic rocks	Surface or volcanic rocks
They have **coarse** texture GR. ***because the size of crystals of minerals forming them is large.***	They have **smooth** texture GR. ***because the size of crystals of minerals forming them is small.***

Places of formation

Plutonic rocks	Surface or volcanic rocks
They are formed **in the depth of the Earth's crust**, where the minerals accumulate forming huge masses of rocks covering wide areas.	They are formed **over the Earth's surface**, where the minerals accumulate forming a flow of lava around the sides of volcano.

GR.

The volcanic rocks contain small circular holes.

Due to the extruding of gases from volcanic flows during their cooling and formation of rock.

Examples *of igneous rocks :*

A Granite	**B Basalt**
	
Kind	
It is a plutonic igneous rock.	It is a volcanic igneous rock.
Colour	
Pink or grey.	Dark coloured.
Size of crystals	
The crystals of minerals forming it are big (can be seen by the naked eye).	The crystals of minerals forming it are small (can't be seen by the naked eye).
Properties	
- It is heavy. - It has rough texture. - It is solid, cohesive and it isn't easily broken.	- It has small circular holes. - It has smooth texture. - It is extremely hard.
Found in	
- The Eastern Desert. - Sinai Peninsula.	- Egypt in Abou-Zaabal. - El-Fayoum. - Near Abou Rawash.
Minerals forming it	
It consists of 3 main minerals, which are :	**It consists of 3 main minerals, which are :**
(1) Quartz 	(1) Olivine 
(2) Mica  Dark mica  Light mica	(2) Pyroxene 
(3) Feldspar 	(3) Feldspar 

TRY TO ANSWER worksheet 20 in the Notebook

UNIT 3

Second The sedimentary rocks

- They represent about 5% only of the total volume of the Earth's crust rocks.
- They form a thin cover, that wraps about 75% of the surface of the Earth's solid mass.



Layers of sedimentary rocks

Formation of sedimentary rocks

The following activity shows how the sedimentary rocks are formed.

Activity
To show transportation and deposition processes.

Steps :

- Bring a rectangular basin and place it in an inclined position.
- Put a mixture of sand, shingle and gravel at its upper part.
- Pour water upon this mixture.
- **What do you notice** when increasing the speed of water current ?



Observation :

- Water takes the smooth sand on its way and the sand deposits in the collecting vessel, while shingle and gravel remain in the rectangular basin.
- If the speed of water increases, the size of the transported grains increases.

Similarly :

The water currents in seas and rivers transport the fragmented particles of rocks and deposit them above each other **in the form of layers**.

* **Formation of sedimentary rocks takes place in three successive stages, which are :**

1. Erosion (fragmentation and disintegration) of the igneous, sedimentary or metamorphic rocks that are previously existed.
2. Transportation of the detritus (fragmented particles of rocks) by water currents or by air, where these particles are deposited.
3. Sedimentation (deposition) of rocks particles in an aqueous or an aerial medium, later these deposited particles adhere together forming the sedimentary rocks.

➲ **From the previous explanation, we can define the sedimentary rocks as follows :**

Sedimentary rocks

– They are rocks formed from the cohesion of sediments.

Or

– They are rocks formed from fragmentation and sedimentation of old rocks.

What are the results based on ?

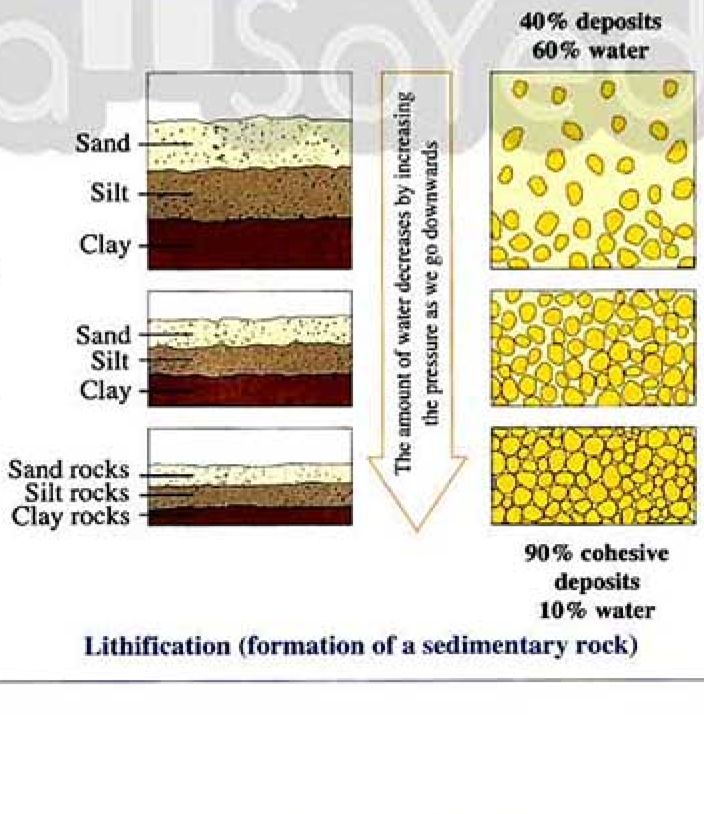
➲ **Increasing the pressure on the grains of rocks.**

The cohesion of the grains of rocks increases by passing time forming layers above each other, the layers in the bottom are older and the above ones are more recent.

GR.

The cohesion of layers of sedimentary rocks increases by passing time.

Because the sediments of the bottom layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains.



Lithification (formation of a sedimentary rock)

UNIT 3

Examples *of sedimentary rocks :*

	A Sandstone	B Limestone
		
Composition	It consists of sand grains that are less than 2 mm in diameter.	It consists of the precipitation of calcium carbonate ($CaCO_3$) in lime solutions.
Minerals forming it	The main component almost is **quartz** mineral.	It consists of **mineral calcite** (calcium carbonate).
Colour	Yellow.	White.
Texture	Coarse.	Smooth.
Coherences	Cohesive.	Less cohesive.
Shape	It has thin layers.	It has thin layers.

How can you differentiate between sandstone and limestone ?

To differentiate between	Sandstone	Limestone
By adding dilute hydrochloric acid to each of them.	No reaction takes place.	A chemical reaction takes place with an effervescence GR. **Due to evolving of carbon dioxide gas.**

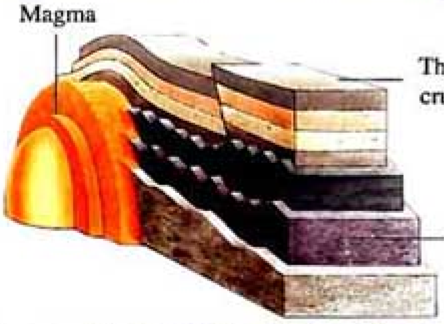


What are the results based on ?

➲ Calcium carbonate precipitates in lime solutions.
Limestone is formed.

Third The metamorphic rocks

- When old rocks (igneous or sedimentary) are subjected to pressure and high temperature, they convert into metamorphic rocks.
- This conversion often takes place in the rocks, that the magma interferes within them and this conversion **depends on** :
  1. The mass of magma and its temperature.
  2. The type of rock which surrounds the magma.



Formation of metamorphic rocks

Metamorphic rocks

They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.

Example *of metamorphic rocks :*

Marble

Composition : - It is produced from the conversion of ***limestone***.

Coherences : - It has more solidity and cohesive than the limestone.

Texture : - Its texture is coarse (rough).

Colour : - Its colour is white if it is pure and has other colours when it contains impurities.

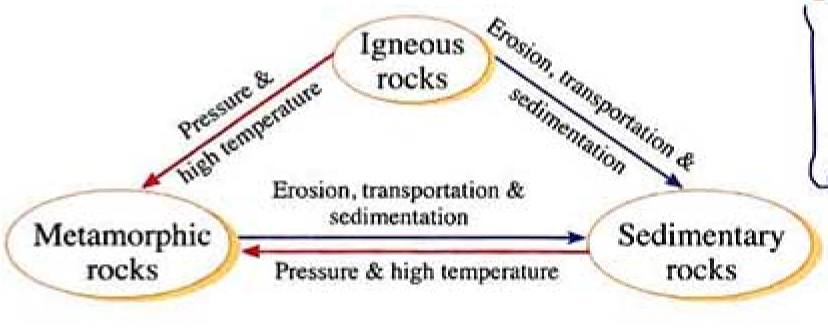


White marble



Coloured marble

*** The following diagram shows the changes of rocks :**



TRY TO ANSWER worksheet 21
- General Exercise of the School Book on Unit 3
- Model Exams on Unit 3

in the Notebook

Remember

- **Soil :** It is a thin non-compacted layer, which covers the Earth's crust.
- **Rock :** It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.
- **Magma :** It is a very hot thick (viscous) liquid underneath the Earth's crust.
- **Lava :** It is the magma when it reaches the Earth's surface.

Types of rocks

1 Igneous rocks

They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.

Types

- Plutonic rocks — **Ex.** Granite
- Surface or volcanic rocks — **Ex.** Basalt

2 Sedimentary rocks

They are rocks formed from the cohesion of sediments.

*** The formation of sedimentary rocks undergoes three stages :**

1. Erosion.
2. Transportation.
3. Sedimentation.

Ex. Sandstone, Limestone

3 Metamorphic rocks

They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.

Ex. Marble

Comparison between granite rock and basalt rock :

Points of comparison	Granite rock	Basalt rock
1. Kind :	Plutonic igneous rock.	Volcanic igneous rock.
2. Colour :	Pink or grey.	Dark in colour.
3. Size of crystals :	Can be seen by naked eye.	Cannot be seen by naked eye.
4. Found in :	The Eastern Desert and Sinai Peninsula.	Egypt in Abou-Zaabal, near Abou-Rawash and El-Fayoum.
5. Minerals forming it :	Quartz, mica and feldspar.	Olivine, pyroxene and feldspar.

Questions
on lesson Three

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. The superficial layer of the Earth's crust is .... layer.
   a. thick b. rocky c. loosened d. unfragmented
2. The soil consists of ....
   a. minerals, water and air only. b. plant roots only.
   c. decayed organic materials only. d. all of the previous answers.
3. The igneous rocks are formed of molten material underneath the Earth's crust, which is called ....
   a. magma. b. lava. c. core. d. mantle.
4. Igneous rocks are divided according to the site of formation in the Earth's surface into .... rocks.
   a. sandstone and limestone b. marble and limestone
   c. plutonic and volcanic d. granite and basalt
5. The volcanic flows is known as ....
   a. magma. b. lava. c. core. d. mantle.
6. Plutonic igneous rocks consist of solidification of ....
   a. magma only. b. lava only.
   c. volcanic flows only. d. (a) and (b) are correct.
7. .... rock is characterized by that it is heavy, rough, solid, cohesive and it isn't easily broken.
   a. Basalt b. Marble c. Limestone d. Granite
8. All of the following are minerals, that form granite rock except ....
   a. quartz. b. olivine. c. mica. d. feldspar.
9. .... is a volcanic rock, which is formed of lava when it cools on the Earth's surface.
   a. Basalt b. Granite c. Marble d. Sandstone
10. .... is from plutonic igneous rocks.
    a. Basalt b. Marble c. Granite d. Limestone
11. All of the following are minerals, that form the basalt rock except ....
    a. pyroxene. b. olivine. c. feldspar. d. mica.
12. Basalt is characterized by that, it has ....
    a. small circular holes. b. grey colour.
    c. glassy luster. d. prism shape.

13. Sedimentary rocks form a thin cover that wraps about .... of the surface of the Earth's solid mass.
    a. 5% b. 75% c. 71% d. 57%
14. When you pass a weak stream of water in the basin by a mixture of gravel, sand and shingle, the water takes on its way ....
    a. grains of smooth sand. b. grains of sand and shingle.
    c. pieces of gravel. d. all of the previous answers.
15. The sequence of sedimentary rocks formation is ....
    a. erosion - sedimentation - transportation.
    b. erosion - transportation - sedimentation.
    c. sedimentation - erosion - transportation.
    d. transportation - erosion - sedimentation.
16. .... are examples of sedimentary rocks.
    a. Granite and basalt b. Marble and sandstone
    c. Sandstone and limestone d. Basalt and limestone
17. The main component of sandstone is ....
    a. quartz mineral. b. feldspar mineral.
    c. mica mineral. d. all of the previous answers.
18. .... is yellow in colour and has a coarse texture.
    a. Sand b. Sandstone c. Limestone d. Granite
19. Limestone has a ....
    a. white colour with coarse texture. b. yellow colour with coarse texture.
    c. yellow colour with smooth texture. d. white colour with smooth texture.
20. Limestone consists of precipitation of .... in lime solutions.
    a. magnesium carbonate b. calcium sulphate
    c. calcium carbonate d. magnesium sulphate
21. .... gas evolves when hydrochloric acid reacts with limestone.
    a. Carbon monoxide b. Carbon dioxide
    c. Hydrogen d. Oxygen
22. We can differentiate between sandstone and limestone by ....
    a. dil.hydrochloric acid (HCl). b. colour.
    c. texture. d. all of the previous answers.
23. The metamorphic rock is produced as a result of the effect of the heat and pressure on the ....
    a. igneous rocks only. b. sedimentary rocks only.
    c. metamorphic rocks only. d. (a) and (b) are correct.

24. .... is produced from conversion of limestone.

a. Granite b. Marble c. Basalt d. Sandstone

25. .... has a white colour when it is pure and coarse texture.

a. Marble b. Limestone c. Sandstone d. Granite

2. (A) Choose from column (B) what suits it in column (A) :

①

(A)	(B)
1. Igneous rocks 2. Sedimentary rocks 3. An example of metamorphic rocks	a. is marble. b. are formed from the molten matter under the Earth's crust. c. are formed from the cohesion of sediments. d. are formed due to the tide.

②

(A)	(B)
1. Granite 2. Basalt 3. Limestone	a. consists of mineral calcite. b. consists of quartz and olivine minerals. c. consists of quartz, feldspar and mica minerals. d. consists of olivine, pyroxene and feldspar minerals.

(B) Choose from column (A) what is suitable for columns (B) and (C) :

(A)	(B)	(C)
1. Basalt 2. Limestone 3. Marble	a. is a dark coloured rock b. has a coarse texture c. is yellow in colour d. has a smooth texture	A. and is an example of metamorphic rocks. B. and is an example of igneous rocks. C. and is an example of sedimentary rocks. D. and is an example of calcareous rocks.

3. Put (✓) or (×) , then correct the wrong ones :

1. The solid basis of the Earth's crust is unfragmented. ( )
2. The plant roots extend easily through the solid basis of the Earth's crust. ( )
3. The mineral consists of one rock or a group of rocks. ( )
4. The magma is pushed upwards on occurrence of earthquake. ( )
5. The minerals that form the volcanic rock have large-sized crystals. ( )
6. The types of igneous rocks are plutonic and volcanic rocks. ( )

7. When the lava cools, it forms a type of sedimentary rocks. ( )
8. The volcanic rocks are characterized by small size of their crystals and contain small circular holes. ( )
9. Granite is a sedimentary rock. ( )
10. Basalt is a volcanic rock. ( )
11. We can differentiate between granite and basalt concerning the colour and texture. ( )
12. Granite exists in the Eastern Desert and Sinai Peninsula, while basalt exists in Egypt in Abou-Zaabal. ( )
13. The sedimentary rocks represent about 5% only of the total volume of the Earth's crust rocks. ( )
14. On the formation of sedimentary rocks, the size of transported grains decreases by increasing the speed of water currents. ( )
15. The above layers in sedimentary rocks are the oldest. ( )
16. Quartz mineral is the main component in granite rock. ( )
17. Limestone exists as thin layers. ( )
18. Limestone is formed due to the precipitation of calcium bicarbonate in lime solutions. ( )
19. Carbon monoxide gas evolves when hydrochloric acid reacts with limestone. ( )
20. Although marble is produced from the conversion of limestone, but it has more solidity than it. ( )
21. Sandstone and marble are examples of metamorphic rocks. ( )
22. The coloured marble is free from impurities. ( )

4. Write the scientific term of each of the following statements :

1. A thin non-compacted layer, which covers the Earth's crust.
2. A natural solid material, that exists in the Earth's crust and it consists of one mineral or a group of minerals.
3. A molten material, that exists at depths beneath the crust.
4. • Magma, when it reaches the Earth's surface.
   • The volcanic flows that spread on the volcanic sides.
5. Rocks are formed by solidification of magma underneath the Earth's crust or lava on the Earth's surface.
6. • A rock formed of lava flows when it comes on the Earth's surface.
   • A rock formed from quick cooling of lava on the surface of the Earth's crust.
7. • The rocks that are formed from slow cooling of magma at the depth of the Earth's crust.
   • Igneous rocks which have a coarse texture and large-sized crystals.
8. A rock which has a pink or grey colour and found in the Eastern Desert.
9. A rock which has a dark colour and found in Abou-Zaabal and El-Fayoum.

10. • Rocks that are formed of the fragmentation and sedimentation of old rocks.
    • Rocks formed from the cohesion of sediments.
    • Rocks that form a thin cover, that wraps about 75% of the surface of the Earth's solid mass.
11. A rock that consists of sand grains that are less than 2 mm in diameter.
12. A sedimentary rock which has the same chemical structure of marble.
13. Rocks that are formed when old rocks (igneous or sedimentary) are subjected to pressure and high temperature.

5. Complete the following statements :

1. The Earth's crust consists of two main parts, which are .... and ....
2. .... is a thin .... layer, which covers the Earth's crust.
3. The soil consists of a mixture of .... , ... , air , decayed .... materials and plant roots.
4. Rocks are classified according to the way of formation into .... , ... and .... rocks.
5. 📖 The molten material that exists beneath ...., which is extremely hot thick fluid in the Earth's interior is known as .... and after its going out to the Earth's surface in the form of ...., it is called ....
6. Igneous rocks are divided according to the site of their formation in the Earth's surface into .... and ....
7. Plutonic rocks have crystals with .... size, while volcanic rocks have crystals with .... size.
8. .... and .... are examples of igneous rocks.
9. Granite is from .... igneous rocks, while basalt is from .... igneous rocks.
10. .... is a pink or grey coloured rock, while .... is a dark coloured rock.
11. 📖 Granite rock consists of .... , ... and .... minerals, while basalt rock consists of .... , ... and .... minerals.
12. 📖 Sedimentary rocks form a thin cover that wraps about .... of the Earth's surface although they represent .... of the total volume of the Earth's crust rocks.
13. Sedimentary rocks are formed as a result of .... , ... and ....
14. The successive layers of sedimentary rocks are sediments in an .... or an .... medium.
15. .... and .... are examples of sedimentary rocks.
16. The colour of limestone is .... and its texture is .... , while the colour of sandstone is .... and its texture is ....
17. The main component of sandstone is .... mineral.

18. Limestone is formed due to the precipitation of .... in .... solutions.
19. .... consists of sand grains, that are less than .... in diameter.
20. We can differentiate between limestone and sandstone by using .... acid.
21. .... mineral consists of calcium carbonate, which is expressed by a formula is ....
22. When hydrochloric acid is added to limestone, ... gas is evolved.
23. When .... and .... rocks are subjected to pressure and high temperature, they transform into .... rocks.
24. The effect of magma when it interferes in the cracks of the Earth's crust rocks depends on the .... of magma and its temperature, and the type of .... which surrounds it.
25. Marble is resulted from transformation of ....

6. Give reasons for each of the following :

1. The plant roots extend easily through the upper part of the Earth's crust, but can't extend through its lower part.
2. The crystals of minerals that form the plutonic igneous rock are large-sized.
3. The crystals of minerals that form the volcanic rock are small-sized.
4. Volcanic rocks contain small circular holes.
5. Granite has a coarse texture, while basalt has a smooth texture.
6. The components of granite rock can be seen by the naked eye.
7. The components of basalt rock cannot be seen by the naked eye.
8. Limestone consists of mineral calcite.
9. Effervescence takes place when hydrochloric acid is added to a sample of limestone.
10. The cohesion of layers of sedimentary rocks increases by passing time.
11. We can differentiate between the sandstone and limestone from colour and texture.
12. Some kinds of marble are coloured and others are white.

7. What are the results based on ... ?

1. The magma comes out of the Earth's surface.
2. Decreasing the temperature of lava on the Earth's surface rapidly.
3. Decreasing the temperature of magma in the depths of the Earth's crust slowly.
4. The minerals that form the plutonic igneous rocks take a long time for crystallization.
5. The minerals that form the volcanic igneous rocks take a short time for crystallization.
6. Extruding of gases from volcanic flows, which form the volcanic rocks.
7. You pour a stream of water on a mixture of sand, shingle and gravel put in a rectangular basin.

8. Increasing the pressure on the grains of rocks forming the layers of sedimentary rocks.
9. You add hydrochloric acid to limestone.
10. Sedimentary rocks are subjected to pressure and high temperature.
11. Melting of limestone by high temperature, then re-crystallization of the minerals forming it gradually.
12. Calcium carbonate precipitates in lime solution.

8. What is meant by ... ?

1. Soil.
2. Rock.
3. Magma.
4. Lava.
5. Igneous rocks.
6. Sedimentary rocks.
7. Metamorphic rocks.

9. Choose the odd word out, then write the scientific name of the rest :

1. Quartz - Mica - Basalt - Feldspar.
2. Olivine - Pyroxene - Feldspar - Mica.
3. Quartz - Calcite - Mica - Feldspar.
4. Erosion - Solidification - Transportation - Sedimentation.

10. Compare between :

1. The soil and the solid basis.
2. Plutonic and volcanic rocks.
3. Magma and lava.
4. Granite and basalt.
5. Sandstone and limestone.
6. Igneous, sedimentary and metamorphic rocks.

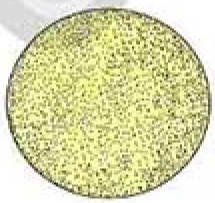
11. Write the names of the rocks that are characterized by each of the following :

1. • An igneous rock has a rough texture and its colour is pink or grey.
   • A rock consists of quartz, feldspar and mica minerals.
2. • A specimen of rocks consists of feldspar, olivine and pyroxene minerals.
   • A volcanic igneous rock has a dark colour, it has small circular holes and its components cannot be seen by the naked eye.
3. A sedimentary rock has a coarse texture, whose colour is yellow and it consists of sand grains.
4. A sedimentary rock has a smooth texture, whose colour is white and it consists of mineral calcite.
5. • A rock that is produced from the conversion of limestone.
   • A rock that has a rough texture, its colour is white if it is pure and it has more solidity and cohesive than the limestone.

12. Variant questions :

1. Classify the Earth's rocks according to their way of formation.
2. Classify the igneous rocks according to the site of their formation.
3. What are the stages of formation of sedimentary rocks ?
4. Explain by a practical activity how the transportation and deposition processes occur during formation of sedimentary rocks.
5. Which of the following rocks is sedimentary, igneous or metamorphic ?
   1. Marble. 2. Granite. 3. Limestone. 4. Sandstone. 5. Basalt.
6. Mention the main minerals, that share in the structure of the following rocks :
   1. Granite. 2. Basalt. 3. Limestone. 4. Sandstone.
7. What are the characteristics we depend on to distinguish between the plutonic igneous rocks and the volcanic igneous rocks ?
8. What are the main factors that lead to the formation of the metamorphic rocks ?
9. How can you distinguish by an experiment between sandstone and limestone ?
10. Give an example of each of the following :
    1. An igneous rock. 2. A sedimentary rock.
    3. A metamorphic rock.
11. The opposite figures show two samples of igneous rocks, answer the following questions :
    1. What is the type of rock (A) and rock (B) ?
    2. What is the scientific evidence relied upon to distinguish between them ?
    3. Give an example of each type.


Rock (A)

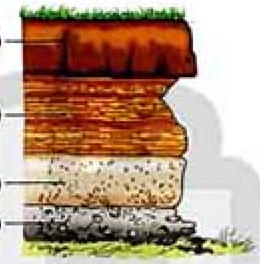

Rock (B)

12. Blocks of limestone used in building are rapidly by the effect aerial factors, comparing with marble, although that marble is produced from the conversion of limestone and chemical structure of each of them is similar, **What is your scientific explanation for that ?**

Timss Questions

1. Choose the correct answer :

1. During the volcanic eruption, the magma moves towards the Earth's surface and becomes volcanic flows. In which layer from Earth's layers, the magma is formed ? ....
   a. The crust. b. The mantle. c. Inner core. d. Outer core.
2. Some volcanic rocks have many holes in them. How were the holes made ? ....
   a. Insects dug into the rock when it was soft.
   b. Gas bubbles were trapped in the rock when it cooled.
   c. Rain dropped on the rock when it was soft.
   d. Small stones fell out of the rock when it cooled.
3. From the opposite figure, the .... layer is considered the oldest layer.
   a. (1) b. (2)
   c. (3) d. (4)



2. Study the opposite diagram, then answer the following questions :

1. What do the numbers (1) and (2) indicate ?
2. How can you differentiate between the rock no. (1) and the sandstone ?
3. What is the difference between the rock no. (1) and marble ?

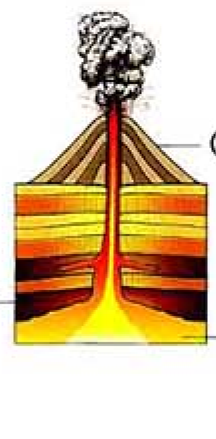


3. The opposite figure shows the way of formation of two types of rocks, which are :

- Rock (X) is crystallized quickly when exposed to atmospheric air.
- Rock (Y) is exposed to pressure and high temperature.

Answer the following questions :

1. Mention the type of each rock (X) and (Y). Give an example of each of them.
2. What happens when the substance (Z) solidifies ?



Glossary



Unit 1

Lesson 1

Chemical combination	اتحاد كيميائى
Metals	فلزات
Nonmetals	لافلزات
Noble gases	غازات نبيلة (خاملة)
Luster	بريق
Malleable	قابل للطرق
Ductile	قابل للسحب
Positive ion	أيون موجب
Negative ion	أيون سالب
Sharing (Participate)	يشارك
Monoatomic	أحادى الذرة
Ionic bond	رابطة أيونية
Attraction	تجاذب
Table salt	ملح طعام
Covalent bond	رابطة تساهمية

Lesson 2

Chemical compounds	مركبات كيميائية
Valency	تكافؤ
Atomic group (Radical)	مجموعة ذرية
Solely	منفردة
Monovalent	أحادى التكافؤ
Divalent	ثنائى التكافؤ
Trivalent	ثلاثى التكافؤ
Tetravalent	رباعى التكافؤ
Pentavalent	خماسى التكافؤ
Hexavalent	سُداسى التكافؤ
Chemical formula	صيغة كيميائية
Acids	أحماض
Bases	قلويات
Oxides	أكاسيد
Salts	أملاح
Dissociate	تتفكك
Mineral acids	أحماض معدنية
Sour	لاذع
Litmus paper	ورقة عباد شمس
Bitter	مُر
Metal oxides	أكاسيد فلزية
Nonmetal oxides	أكاسيد لافلزية

Lesson 3

Chemical equation	معادلة كيميائية
Chemical reaction	تفاعل كيميائى
Fertilizers	أسمدة
Magnesium ribbon	شريط ماغنسيوم
Reactants	متفاعلات
Products	نواتج
Set of symbols	مجموعة رموز
Law of conservation of matter	قانون بقاء المادة
Law of constant ratios	قانون النسب الثابتة
Direct combination reactions	تفاعلات الاتحاد المباشر
Ammonia solution	محلول نشادر
White clouds	سُحب بيضاء
Concentrated (Conc.)	مركز
Environmental pollution	تلوث بيئى
Greenhouse	صوبة زجاجية
Permit	يسمح
Penetration	اختراق
Headache	صداع
Faint	تعب (ارهاق)
Stomach-aches	ألم بالمعدة
Malfunction	خلل وظيفى
Corrosion	تآكل
Lightning	برق
Poisonous	سام
Cellulose fibres	ألياف سليلوزية
Cancer	سرطان

Unit 2

Lesson 1

Fundamental forces in nature	القوى الأساسية فى الطبيعة
Force	قوة
Improper	غير لائق
Proper	لائق
Static	ساكن
Attempt	يحاول/محاولة
Lightning	البرق
Thunder	الرعد
Wind motion	حركة الرياح
Fire weapons	الأسلحة النارية
Nuclear explosions	الانفجارات النووية
Atomic reactors	المفاعلات الذرية
Gravitational forces	قوى جاذبية
Electromagnetic forces	قوى كهرومغناطيسية
Nuclear forces	قوى نووية
Weak nuclear forces	قوى نووية ضعيفة
Strong nuclear forces	قوى نووية قوية
Earth's gravitational force	قوة جذب الأرض

Glossary

Mass كتلة
Object's weight وزن الجسم
Earth's gravitational acceleration عجلة الجاذبية الأرضية
Approach تقترب
Magnetic force قوة مغناطيسية
Electric current تيار كهربى
Flow of electric charges سريان الشحنات الكهربية
Electromagnet مغناطيس كهربى
Isolated copper wire سلك نحاسى معزول
Wrought iron حديد مطاوع
Iron filings برادة حديد
Applications تطبيقات
Scrap iron حديد خُردة
Ports موانئ
Electric generator مولد كهربى
Massive amount كمية مختزنة
Military purposes أغراض عسكرية
Accompanied مُصاحبة
Radioactive elements عناصر مُشعة
Scientific researches أبحاث علمية

Lesson 2

Accompanied forces قوى مصاحبة
Force of inertia قوة القصور الذاتى
Friction force قوة الاحتكاك
Rushed forward اندفاع إلى الأمام
Resist يقاوم
Safety belts أحزمة الأمان
Resistance مقاومة
Brakes فرامل
Slipping الانزلاق
Performance كفاءة
Lubricating تشحيم
Oiling تزييت
Erosion تأكل
Coarse خشن
Uni-cellular وحيد الخلية
Multi-cellular عديد الخلايا
Concentration تركيز

Lesson 3

Wave motion الحركة الموجية
Relative motion الحركة النسبية
Opposite direction اتجاه عكسى
Frame of reference نقطة مرجعية
Transitional motion حركة انتقالية
Periodic motion حركة دورية
Regularly repeated تتكرر بانتظام
Vibrating motion حركة اهتزازية
Circular motion حركة دائرية
Mechanical waves أمواج ميكانيكية
Electromagnetic waves أمواج كهرومغناطيسية
Relatively low قليلة نسبيًا
Extremely high كبيرة جدًا
Solar explosions انفجارات على سطح الشمس
Curing sets أجهزة علاجية
Stringed musical instruments أجهزة موسيقية وترية
Pneumatic musical instruments أجهزة موسيقية هوائية
Night vision apparatus جهاز الرؤية الليلية
Sterilize يعقم
Surgical operations rooms حجرات العمليات الجراحية
Bone fractures كسور عظمية
Swellings أورام

Unit 3

Lesson 1

Celestial bodies أجسام فضائية
Space فضاء
Stars نجوم
Clear moonless nights ليالى مقمرة صافية
Huge number عدد هائل
Bright bodies أجسام لامعة
Emit تشع
Enormous amounts كميات هائلة
Astronomers الفلكيون
Light year السنة الضوئية
Galaxy مجرة
Solar system النظام الشمسى
The Way of Chopped Hay galaxy مجرة درب التبانة
Milky Way galaxy مجرة الطريق اللبنى
Coiled spiral arms أذرع حلزونية ملتفة
Planets كواكب
Moons أقمار
Asteroids الكويكبات
Meteors الشهب
Meteorites النيازك
Comets المذنبات
Opaque bodies أجسام معتمة
Inner planets كواكب داخلية
Outer planets كواكب خارجية
Giant planets كواكب عملاقة
Extreme coldness البرودة القاسية

English	Arabic
Density	كثافة
Follower	تابع
Rocky masses	كتل صخرية
The belt of the wanderer asteroids	حزام الكويكبات السيارة
Luminous arrows	سهام ضوئية
Elongated elliptical orbits	مدارات بيضاوية شديدة الاستطالة
Solidified gases	غازات متجمدة
Gaseous cloud	سحابة غازية
Discovering	اكتشاف
Identifying	التعرف على
Reflecting telescope	التلسكوب العاكس
Refracting telescope	التلسكوب الكاسر

Lesson 2

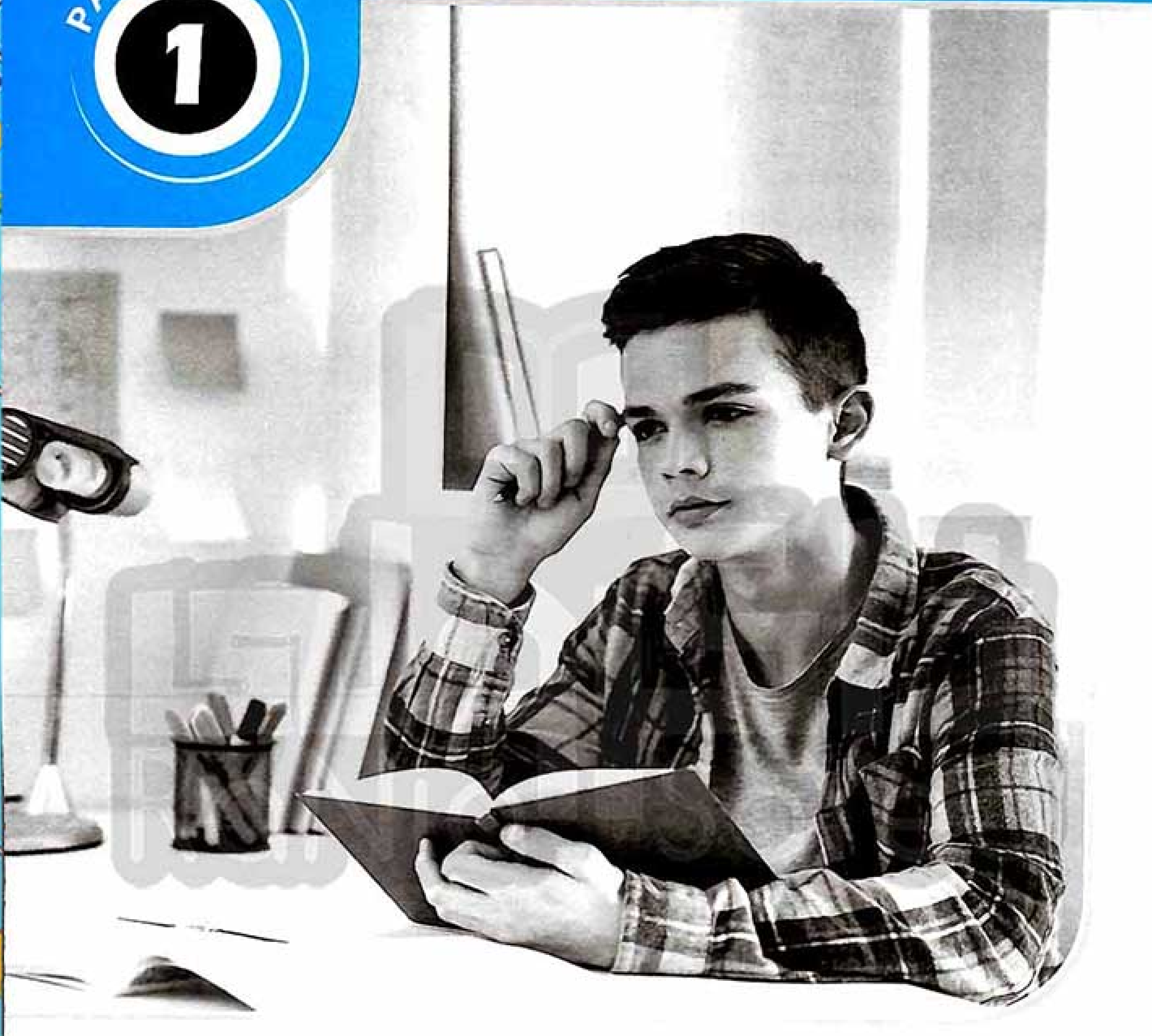
English	Arabic
Description	وصف
Earth's rotation	دوران الأرض
Earth's location	موقع الأرض
Slight flattening	تفلطح بسيط
Two poles	القطبين
Indented	منبعج
Equator	خط الأستواء
Tropical radius	نصف القطر الأستوائى
Polar radius	نصف القطر القطبى
Atmosphere	الغلاف الجوى
Hydrosphere	الغلاف المائى
Air pressure	الضغط الجوى
Captured	مُلتقطة
Combustion	احتراق
Weather	الطقس
Climate	المناخ
Salty water	ماء مالح
Fresh water	ماء عذب
Constancy	ثبات
Steadfastness	استقرار
Earth's crust	القشرة الأرضية
The mantle	الوشاح
The core	اللب

Lesson 3

English	Arabic
Components	مكونات
Superficial layer	طبقة سطحية
Fragmented	مفتته
Loosened	مفككه
Minerals	معادن
Decayed organic materials	مواد عضوية متحللة
Soil	تربة
Solid basis	الاساس الصلب
Rock	صخر
Igneous rocks	صخور نارية
Sedimentary rocks	صخور رسوبية
Metamorphic rocks	صخور متحولة
Magma	الماجما (الصهارة)
Molten material	مادة منصهرة
Lava	اللافا
Solidification	التجمد
Undernearth	أسفل
Volcanic flows	حمم بركانية
Plutonic rock	صخر جوفى
Volcanic rock	صخر بركانى
Huge masses	كتل ضخمة
Coarse texture	نسيج خشن
Volcanoes	براكين
Smooth texture	نسيج ناعم
Small circular holes	فجوات دائرية صغيرة
Crystals	بللورات
Granules	حبيبات
Granite	جرانيت
Basalt	بازلت
Heavy	ثقيل
Rough	خشن
Cohesion	تماسك
Cohesive	متماسك
Feldspar	الفلسبار
Pyroxene	البيروكسين
Mica	الميكا
Olivine	الاوليفين
Mixture	خليط
Wrap	يغلف
Erosion	تعرية
Disintegration	تفتت (تحلل)
Transportation	نقل
Deposition (sedimentation)	ترسيب
Sand	رمل
Shingle	حصى
Gravel	زلط
Sandstone	الحجر الرملى
Limestone	الحجر الجيرى
Lime solutions	محاليل جيرية
Marble	رخام
Impurities	شوائب
Solidity	صلابة

PART 1

Worksheets



Worksheets on :

Unit One : Chemical Reactions.

Unit Two : Force and Motion.

Unit Three : Earth and Universe.

UNIT ONE Chemical Reactions

Lesson 1 Chemical Combination

Worksheet 1

1. Complete the following :

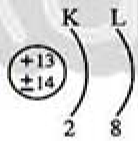
1. .... is the only liquid nonmetal element, while .... is the only liquid metal element.
2. During the chemical reaction, magnesium atom ($^{24}_{12}Mg$) .... two electrons and changes into ....
3. The outermost energy level of chlorine atom ($^{35}_{17}Cl$) contains .... electrons, while that of chloride ion contains .... electrons.
4. Nonmetals are .... conductors of electricity except .... which is a good conductor of electricity.
5. Elements can be classified according to their properties and electronic structure into .... , ... and ....

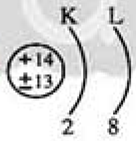
2. Choose the correct answer :

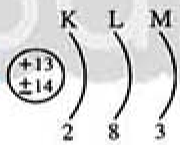
1. All of the following elements change into negative ions during chemical reactions except ....

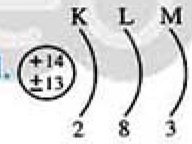
   a. $^{35}_{17}Cl$ b. $^{16}_{8}O$ c. $^{14}_{7}N$ d. $^{24}_{12}Mg$

2. Which of the following figures represents the structure of aluminium ion ? (Fig.) ....

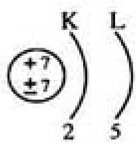
   a. 

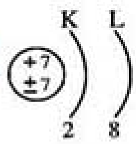
   b. 

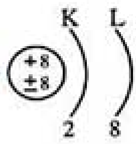
   c. 

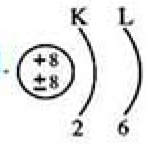
   d. 

3. Which of the following figures represents the structure of nitrogen ion ? (Fig.) ....

   a. 

   b. 

   c. 

   d. 

4. During chemical reactions, oxygen atom ($^{16}_{8}O$) gains electrons and changes into ....

   a. O^{-} b. O^{+} c. O^{-2} d. O^{+2}

5. The following elements are good conductors of electricity except ....

   a. $_{8}O$ b. $_{11}Na$ c. $_{12}Mg$ d. $_{13}Al$

3. **A. Write the scientific term for each of the following :**

1. The atom which gained an electron or more during the chemical reaction. [..........................]
2. The atom which lost an electron or more during the chemical reaction. [..........................]
3. Elements don't participate in chemical reactions due to the completeness of their outermost energy level. [..........................]

B. Put (✓) or (✗), then correct what is wrong :

1. The number of energy levels in positive ion is more than that of its atom.
( ) ....
2. During the chemical reaction, sodium loses two electrons and changes into positive ion.
( ) ....
3. The outermost energy levels of metals contain 5 , 6 or 7 electrons.
( ) ....

4. **A. Give reasons for :**

1. When an atom gains an electron or more during the chemical reaction, it becomes a negative ion.
....
2. Both aluminium ion and nitrogen ion have the same number of electrons. [knowing that : $^{27}_{13}Al$ & $^{14}_{7}N$].
....
....
3. Both sulphur ion and calcium ion have the same number of energy levels. [knowing that : $_{16}S$ & $_{20}Ca$].
....
....

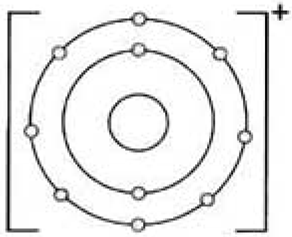
B. Mention the characteristics (properties) of metals.

....
....
....

PART 1

Worksheet 2

1. The opposite figure shows the electronic configuration of ion of an element.



1. Mention the type of the element and its atomic number.

....

2. What is the number of protons in this ion ?

....

3. What is the type of the bond formed from the combination of this ion with negative chloride ion ?

....

2. A. What is meant by ... ?

1. Ionic bond : ....

2. Covalent bond : ....

B. Give reasons for :

1. The bond in a hydrogen molecule is a single covalent bond.

....

2. The chlorine atom ($_{17}Cl$) tends to combine with potassium atom ($_{19}K$) by an ionic bond.

....

3. Complete the following :

1. During the formation of NaCl molecule, ... atom loses an electron which is gained by .... atom.
2. The bond in sodium chloride molecule is .... bond, while the bond in nitrogen molecule is .... bond.

UNIT ONE

Lesson 2 Chemical Compounds

Worksheet 3

1. Complete the following :

1. The valency of ferric is ...., while that of ferrous is ....
2. The chemical formula of sodium hydroxide is ...., while that of sulphuric acid is ....
3. During chemical reactions, oxygen atom can .... or .... two electrons.
4. The chemical formula of bicarbonate group is .... and its valency is ....
5. The table salt molecule is formed of combination of .... positive ion and .... negative ion.

2. A. What is meant by ... ?

1. Valency : ....
....
2. The chemical formula of silver chloride is AgCl : ....
....

B. Write the chemical formula of each of the following :

1. Aluminium carbonate : ....
2. Sodium sulphate : ....
3. Magnesium hydroxide : ....
4. Ammonium carbonate : ....
5. Calcium phosphate : ....

3. A. Choose the correct answer :

1. All of the following are monovalent atomic groups except ....
   a. nitrate. b. bicarbonate. c. phosphate. d. nitrite.
2. The chemical formula of calcium carbonate is ....
   a. Ca_2CO_3 b. $CaCO_3$ c. $CaCO_2$ d. $CaSO_4$

B. Write the scientific term for each of the following :

1. A set of atoms of different elements joined together and behave like one atom during the chemical reaction. [..........................]

PART 1

2. A formula that represents the number and the type of the atoms in a molecule.

[..........................]

4. A. Rewrite the following statements after correcting them :

1. Water molecule consists of two atoms of three different elements.

....

2. The valency of carbon in (CO_2) molecule is divalent.

....

3. The valency of noble gases is monovalent.

....

B. Give reasons for :

1. Sodium is monovalent, while calcium is divalent.

....

....

2. Aluminium oxide molecule is composed of two aluminium atoms and three oxygen atoms.

....

Worksheet 4

1. A. Write the scientific term for each of the following :

1. Compounds dissociated in water producing negative hydroxide ions.

[..........................]

2. Compounds produced as a result of the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen). [..........................]

B. Give reasons for :

1. Acids turn the colour of litmus paper into red.

....

2. Limewater is from bases, while lead sulphate is from salts.

....

2. A. Complete the following :

1. Bases change the colour of litmus paper into .... due to the presence of .... ions.

2. Calcium nitrate is an example of water .... salts, while lead iodide is an example of water .... salts.

B. How can you distinguish between two unmarked tubes, one contains an acid and the other contains a base ?

....

....

....

3. Choose the correct answer :

1. When an element ($_{11}X$) combines with oxygen, the symbol of the produced oxide is ....
   a. XO b. X_2O c. XO_2 d. X_2O_3
2. All of the following are water soluble salts except ....
   a. sodium chloride. b. sodium sulphide.
   c. silver chloride. d. potassium sulphate.
3. Sulphuric acid is characterized by all of the following except ....
   a. its chemical formula is (H_2SO_4). b. it is a mineral acid.
   c. it changes the colour of litmus into red. d. it has a bitter taste.

4. A. Give an example for each of the following :

1. Nonmetal oxide : ....
2. Water insoluble salt : ....
3. Mineral acid : ....
4. Metal oxide : ....

B. Compare between sodium hydroxide and sulphuric acid.

Sodium hydroxide	Sulphuric acid
....	....
....	....
....	....
....	....
....	....

PART 1

Worksheet 5 on Lessons 1 & 2

1. Complete the following :

1. The ion of iron II is called .... , while the ion of iron III is called ....
2. The ion of metallic element is .... charge, while the ion of nonmetallic element is .... charge.
3. The valency of metallic atoms indicates the number of electrons that are .... during the chemical reaction, while the valency of nonmetallic atoms indicates the number of electrons that are .... or ....
4. In .... ion, the number of protons in the nucleus is less than the number of .... that rotate around it.

2. Give reasons for :

1. Argon element can't form positive ion or negative ion in ordinary conditions.
....
2. We can differentiate between acids and bases by using litmus paper.
....
....

3. A. Identify the type of the following compounds :

1. SO_3 : ....
2. $PbSO_4$: ....
3. $Ca(OH)_2$: ....
4. HNO_3 : ....

B. Choose the correct answer :

1. From properties of graphite element that ....
   a. it is a malleable and ductile. b. it has a metallic luster.
   c. it is a good conductor of electricity. d. no correct answer.
2. The changing of lithium atom (Li) into lithium ion (Li^+) means it ....
   a. gains proton. b. gains electron. c. loses proton. d. loses electron.

3. From properties of acids that ....

a. they change the colour of red litmus paper into blue.

b. they have a bitter taste.

c. they give H^+ ions on dissociation in water.

d. no correct answer.

4. A. Write the chemical formula of the following compounds :

1. Sodium oxide : ....
2. Copper sulphate : ....
3. Sodium carbonate : ....
4. Hydrochloric acid : ....

B. Define :

1. The ion : ....
....
2. Atomic group : ....
....

UNIT ONE

Lesson 3 Chemical Equations & Reactions

Worksheet 6

1. **A. In the following reaction :**

$$2Mg + O_2 \xrightarrow{\Delta} 2MgO$$

1. The .... bond in oxygen molecule is broken to give .... atoms.
2. Magnesium atom conbines with .... atom to form .... molecule.
3. Given that the mass of (Mg) = 24 and that of (O) = 16

Calculte the total mass of the products.

....

B. Rewrite the following chemical equations after balancing them :

1. $N_2 + H_2 \longrightarrow NH_3$

....

2. $Ca + O_2 \longrightarrow CaO$

....

3. $KI + Cl_2 \longrightarrow 2KCl + I_2$

....

2. **Give reasons for :**

1. On burning a magnesium ribbon in air, a white powder is formed.

....

....

2. The chemical equation should be balanced.

....

3. **What is meant by ... ?**

1. Chemical reaction : ....

....

2. Law of constant ratios : ....

....

4. **Express the reaction of hydrogen with oxygen to form water by balanced symbolic and word equations with achieving the law of conservation of matter.**

[knowing that the atomic mass of H = 1 and O = 16]

....

....

....

Worksheet 7

1. What happens in each of the following : [Explain your answer with balanced chemical equation] :

1. Putting a glass rod wet with conc. hydrochloric acid close to the opening of a test tube containing ammonia solution.

....

....

2. Burning a piece of coal in air.

....

....

2. A. Write the scientific term :

1. Reactions which involve combination between a compound with another or an element with another. [..........................]
2. Oxides that cause building corrosion. [..........................]
3. The gas which acts as a greenhouse effect. [..........................]

B. Write a short paragraph on greenhouse phenomenon.

....

....

....

3. Give reasons for :

1. Lightning causes environmental pollution.

....

2. Risk of nitrogen oxides on human health.

....

4. Compare between carbon oxides and sulphur oxides [Concerning : Examples - The negative effect] :

Points of comparison	Carbon oxides	Sulphur oxides
1. Examples :	....	....
2. Negative effect :	....	....

General Exercise of the School Book on Unit ONE

Question 1

Write the scientific term :

1. The number of electrons gained or lost via an atom during a chemical reaction. [..........................]
2. A bond resulted from the electrical attraction between a metal atom (positive ion) and nonmetal atom (negative ion). [..........................]
3. Substances dissociate in water producing positive hydrogen ions (H^+).[..........................]
4. Breaking the reactants bonds and forming new ones among the products. [..........................]
5. A set of joined atoms behaving like a single atom during the chemical reaction. [..........................]
6. A set of chemical formulae and symbols expressing the reactants, the products and the reaction conditions. [..........................]
7. Substances are dissociated in water producing negative hydroxide ions $(OH)^-$. [..........................]

Question 2

A Knowing that the atomic number for oxygen (O) is 8, show via diagram the way that the two atoms of oxygen are combined, then show the type of the produced bond.

....

....

....

B Compare between each pair :

1. An atom and an ion.

An atom	An ion
....	....
....	....
....	....
....	....

2. Ionic bond and covalent bond.

Ionic bond	Covalent bond
....	....
....	....
....	....
....	....

3. Metals and nonmetals.

Metals	Nonmetals
....	....
....	....
....	....
....	....
....	....

4. An acid and an alkali.

An acid	An alkali
....	....
....	....
....	....
....	....
....	....

Question 3

A Indicate using symbolic and word equations, an example of the types of direct combination reaction between :

1. Element with an element :

....

....

2. Element with a compound :

....

....

3. Compound with another compound :

....

....

PART 1

B **Write the chemical formula for the following :**

1. Calcuim nitrate : ....
2. Copper sulphate : ....
3. Soduim carbonate : ....
4. Aluminuim oxide : ....

C **One of your classmates has asked you to share him writing a report on the role of technology in chemical reactions, indicating the importance and highlighting its bad effects on the environment. What is the information you will support him with ?**

....
....
....
....

Model Exams on Unit ONE

Model Exam 1

..... / 20

Answer the following questions :

Question 1 (5 marks)

A Put (✓) or (✗), then correct the wrong one :

1. The mass of a molecule of chlorine equals 71 gm. [Cl = 35.5].

   ( ) ....

2. The chemical formula of nitrate group is $(NO_2)^-$, while that of nitrite group is $(NO_3)^-$.

   ( ) ....

3. Calcium sulphate molecule is formed of 3 atoms for six different elements.

   ( ) ....

4. The ion of beryllium element ($_4Be$) carries one positive charge.

   ( ) ....

5. The number of energy levels in chloride ion equals the number of energy levels in argon atom ($_{18}Ar$).

   ( ) ....

B Write the name of the following compounds :

1. $NaNO_3$: ....
2. $Ca(OH)_2$: ....

Question 2 (5 marks)

A What is meant by ... ?

1. Negative ion : ....
2. The law of constant ratios : ....

PART 1

B **Write the electronic configuration for each of the following atoms :**

$$_{18}Ar - _{12}Mg - _{16}S - _{8}O - _{11}Na$$

Then indicate :

1. The type of each element (metal - nonmetal - noble gas).
2. The type of ion for each of them (positive - negative - no ions).
3. the valency of each of them.

....

....

....

....

Question 3 *5 marks*

Complete the following :

1. To form 2 molecules of water, ... molecule(s) of hydrogen reacts with .... molecule(s) of oxygen.
2. Burning of coal and cellulose fibers cause .... pollution and ....
3. The chemical formula of aluminium hydroxide is .... and that of calcium carbonate is ...., while that of sulphuric acid is ....
4. The bond in (NaCl) molecule is ...., while the bond in (H_2O) molecule is ....
5. Covalent bonds are formed between two .... elements.

Question 4 *5 marks*

A **How can you differentiate between :**

1. H_2SO_4 and $Ca(OH)_2$

....

2. NaCl and AgCl

....

B **Choose the correct answer :**

1. The bond in oxygen molecule is a/an .... bond.

a. ionic b. single covalent c. double covalent d. triple covalent

2. The chemical reactions are used in ....

a. medicine industry.
b. fertilizers industry.
c. food industry.
d. all of the previous answers.

3. The mass of 2 molecules of sodium hydroxide equals .... gm.
[knowing that the atomic mass of sodium (23), hydrogen (1) and oxygen (16)].

a. 80
b. 40
c. 20
d. 10

4. The chemical formula of nitric acid is ....

a. H_2O
b. HCl
c. H_2SO_4
d. HNO_3

Model Exam 2

20

Answer the following questions :

Question 1 — 5 marks

A Write the scientific term for each of the following :

1. Breaking of the reactants bonds and forming new ones among the products. [..........................]
2. A bond resulted from sharing of each atom with three electrons. [..........................]

B Give reasons for :

1. Acids change the colour of litmus into red, while bases change the colour of litmus into blue.

....

....

2. White clouds are formed when ammonia gas reacts with conc. hydrochloric acid.

....

....

3. When an atom loses an electron or more during the chemical reaction, it becomes a positive ion.

....

....

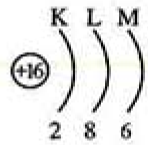
PART 1

Question 2 — 5 marks

A Identify the type of the following compounds :

1. KOH : .... 2. MgO : ....
3. H_2SO_4 : .... 4. NaCl : ....

B The opposite figure shows the electronic configuration of an element. Mention :



1. The type of element : ....
2. Two valencies for this element : .... and ....

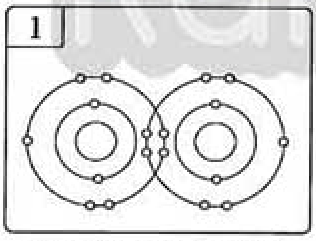
Question 3 — 5 marks

Complete the following :

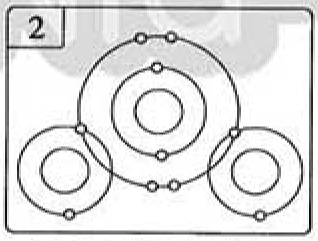
1. .... and .... are examples of metal oxides, while .... and .... are examples of nonmetal oxides.
2. Increasing the ratio of .... gas in air leads to increasing the air temperature.
3. Elements of .... are malleable and ductile, while elements of .... are not malleable or ductile.
4. .... oxides affect the nervous system, while .... oxides cause respiratory system malfunction.
5. On dissolving in water alkalis give negative .... ions.

Question 4 — 5 marks

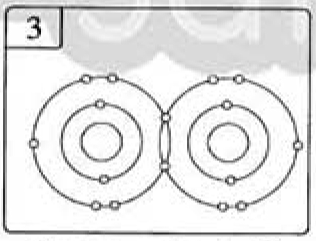
Copy the following figures in your answer paper after correcting the mistake :



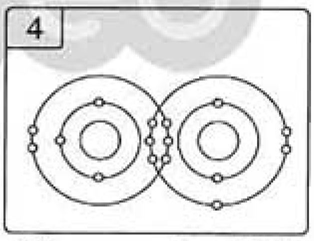
Fluorine molecule F_2



Water molecule H_2O



Oxygen molecule O_2



Nitrogen molecule N_2

1	2	3	4

UNIT TWO Force and Motion

Lesson 1 Fundamental Forces in Nature

Worksheet 8

1. A. What is meant by ... ?

1. Force : ....
....
2. Object's weight : ....

B. Complete the following statements :

1. When a racket hits the tennis ball, a .... acting on the ball causing the change of its ....
2. .... , electromagnetic forces, and .... are the main three divisions of forces in the nature.

2. A. Choose the correct answer :

1. All of the following are examples for some fundamental phenomena except ....
   a. nuclear explosions. b. wind motion. c. water motion. d. lightning.
2. .... is the measuring unit of the force.
   a. Newton b. Metre c. Kilogram d. Coulomb
3. All of the following are from the effects of the force except ....
   a. moving a static object.
   b. changing the direction of a moving object.
   c. changing object's mass.
   d. increasing the speed of a moving object.

B. Give reasons for :

1. Object weight changes from one place to another on the Earth's surface.
....
2. When you push a wall, it doesn't move.
....

3. A. 1. Calculate the weight of an object of 5 kg mass [Knowing that the acceleration due to gravity is 10 m/sec^2].

....
....

PART 1

2. **Calculate the mass of a child, its weight is 392 newton. [knowing that the acceleration due to gravity is 9.8 m/ sec^2].**

....

B. Put (✓) or (✗) :

1. Object's weight is a fixed value, while the object's mass changes from a place to another on the Earth's surface. ( )
2. The exerted work to lift an object increases by increasing the object's mass. ( )
3. The mass of a person at the equator is less than that its mass at the two poles. ( )

4. What happens in the following cases ... ?

1. When the object's mass increases (concerning the object's weight).

....

2. When you kick a static ball by your foot.

....

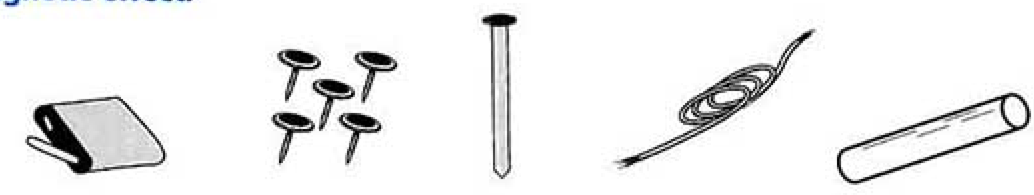
Worksheet 9

1. Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Electric motor.	a. changes the mechanical energy into electric energy.
2. Electromagnet.	b. changes the electric energy into mechanical energy.
3. Electric generator.	c. changes the electric energy into magnetic energy.

1. .... 2. .... 3. ....

2. By using the following materials. How can you prove that electric current has a magnetic effect.



Dry battery | Pins | Nail of wrought iron | Isolated copper wire | Plastic tube

Steps : ....

....

....

Observation : ....

Conclusion : ....

3. A. Complete the following :

1. Egypt seeks to use .... energy in producing electricity.
2. The nuclear forces can be divided into .... and ....
3. An atom stores a massive amount of energy inside its ....
4. The fan and electric mixer are from devices that change .... energy into .... energy.

B. What is the importance of ... ?

1. Strong nuclear forces : ....
....
2. Weak nuclear forces : ....
....

4. What are the forces responsible for each of the following :

1. Falling of objects towards the Earth's surface. [..........................]
2. Changing the mechanical energy into electric energy. [..........................]
3. Producing electricity from nuclear energy. [..........................]
4. The emission of some invisible radiations from radioactive elements. [..........................]

UNIT TWO

Lesson 2 Accompanied Forces to Motion

Worksheet 10

1. A. Complete the following :

1. .... and .... are from the accompanied forces to motion.
2. Passengers are .... once the vehicle moves forward suddenly after it was at rest due to .... force.

B. Choose the correct answer :

1. When the horse is tripped, the horse rider is suddenly rushed forward, this is related to the force of ....
   a. inertia. b. centrifugal. c. gravitational. d. horse pushing.
2. .... is a technological application on inertia.
   a. Car tyres b. Safety belts
   c. Pulse inside blood vessels d. Cars' brakes

2. Which of the two figures represent stopping the bus suddenly and moving the bus suddenly (Give a reason) :


Fig. (1)


Fig. (2)

....
....
....
....

3. A. What is meant by inertia ?

....
....

B. Put (✓) or (✗) , then correct the wrong ones :

1. Force is a property of an object has to resist the change of its state.
   ( ) ....
2. The football player is rushed forward and falls down if he is tripped during running.
   ( ) ....

4. Give reasons for :

1. The car passengers are rushed forward when the moving car stops suddenly.

....

2. Policemen advise drivers to use safety belts in cars.

....

3. The person falls on his face if he collides with a stone while running.

....

Worksheet 11

1. A. What is meant by friction force ?

....

....

B. Put (✓) or (✗) , then correct the wrong ones :

1. Heart muscle contraction and relaxation helps the heart to pump blood all over the body organs.
   ( ) ....
2. Liquids transport through pores and the walls of cells from the higher concentration to the lower one.
   ( ) ....
3. Asphalt is more rough in curved roads to reduce friction forces.
   ( ) ....

2. Mention :

A. Three benefits of friction :

....

....

....

B. Three of the biological operations related to the forces inside living systems :

....

....

....

3. Give reasons for :

1. Lubricating and oiling of mechanical machines.

....

2. Car tyres are covered with a very coarse substance.

....

PART 1

Worksheet 12 on Lessons 1 & 2

1. Correct the underlined words :

1. The idea of lubricating machines depends on reducing its **speed**. [..........................]
2. Electromagnet is used in making **the calculator**. [..........................]
3. The liquids transport through pores and the walls of cells from the lower concentration to higher one by the effect of **inertia forces**. [..........................]
4. Egypt seeks to use **mechanical energy** in producing electricity. [..........................]
5. Car brakes are from applications on **Earth's gravitational** forces. [..........................]

2. Mention three harms of friction :

....

....

....

3. A. Write the scientific term :

1. The product of multiplying object's mass by Earth's gravitational acceleration. [..........................]
2. Resistant forces originate between the object in motion and the medium touching it. [..........................]
3. An instrument used to change the mechanical energy into electric energy. [..........................]

B. If the Earth's gravitational acceleration at the Earth's surface is 9.8 m/sec^2 and it becomes 9.2 m/sec^2 at a height of 200 km above the Earth's surface level. Calculate the amount of decrease in the weight of a person, its mass is 75 kg at this height.

....

....

....

4. A. Complete the following :

1. Policemen advise drivers to use .... in cars and planes, as they act on stopping the forces of ....
2. Electromagnet changes .... energy into .... energy.
3. Liquids transport through the walls of the cells from the .... concentration to the .... concentration.

B. What happens when .... ?

1. Migration of a bird from the south pole to the equator (related to : the mass and the weight of the bird).

....

....

2. A moving bus stops suddenly (concerning the driver and the passengers)

....

....

UNIT TWO

Lesson 3 Motion

Worksheet 13

1. A. Give one example for :

1. Circular motion : ....
2. Wave motion : ....
3. Vibrating motion : ....

B. Choose the correct answer :

1. In the periodic motion, the ....
   a. pathway is straight.
   b. motion is regularly repeated.
   c. time is regularly repeated.
   d. speed is regularly changed.
2. All of the following are periodic motions except the ....
   a. movement of the Moon around the Earth.
   b. pendulum motion.
   c. train motion.
   d. sunflower motion.

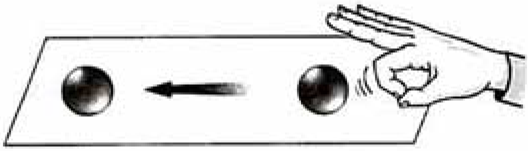
2. Define each of the following :

1. Periodic motion : ....
....
2. Relative motion : ....
....
3. Transitional motion : ....
....

3. Complete the following statements :

1. .... and .... are from the examples of transitional motion.
2. If you are in a stopping car and another car moves forward beside you, you will imagine that your car moves in .... direction.
3. Types of motion are .... motion and .... motion.

4. Mention the type of motion represented by each figure :



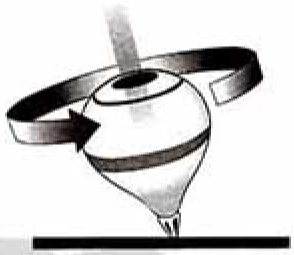
.... (1)



.... (2)



.... (3)



.... (4)

Worksheet 14

1. Compare between mechanical waves and electromagnetic waves (giving examples) :

Mechanical waves	Electromagnetic waves
....	....
....	....
....	....
....	....
....	....
....	....

2. A. Complete the following statements :

1. .... and .... rays are emitted from the Sun.
2. The waves causing the wave motion are divided into two types which are .... and ....

B. Put (✓) or (✗) :

1. Flute and lute are examples of pneumatic musical instruments. ( )
2. Gamma rays, X-rays and ultraviolet rays are used in medical purposes. ( )

PART 1

3. **Give reasons for :**

1. We see lightning before hearing thunder.

....

2. We receive the sunlight and we don't hear the sound of solar explosions.

....

....

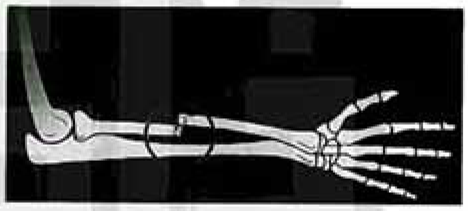
3. Astronauts can't hear each other voices directly in the space.

....

4. **A. Mention one application for the electromagnetic waves used in the following fields :**

1. Medical field : ....
2. Photography field: ....
3. Heat field : ....
4. Remote sensing field : ....

B. The opposite figure shows a fracture in the bones of one arm :



1. Mention the name of the waves used for this type of photography, then mention another technological application for these waves.

....

2. What is the difference between these waves and sound waves ?

....

....

General Exercise of the School Book on Unit TWO

Question 1

Choose the correct answer :

1. A force is an effect ....
   a. always changes the state of an object motion.
   b. never changes the state of an object motion.
   c. always changes an object position and direction.
   d. may change the state of an object motion.
2. An object's weight on the Earth's surface is related to .... forces.
   a. electromagnetic b. gravitational c. weak nuclear d. strong nuclear
3. The amount of Earth's gravitational pull on the object is ....
   a. object's mass. b. object's weight.
   c. gravitational acceleration. d. centrifugal force.
4. Electromagnetic forces affect on the operation of the following except for ....
   a. dynamo (electric generator). b. electric motor.
   c. car internal combustion engine. d. electromagnet.
5. When the horse is tripped, the horse rider is suddenly pushed forward, this is related to the force of ....
   a. inertia. b. centrifugal.
   c. gravitational. d. the horse pushing.
6. The following forces and operations are an application on friction except for ....
   a. walking on the road.
   b. car motion due to rotation of its wheel.
   c. operation of dynamo (electric generator).
   d. stopping the car using the brakes.
7. All of the following are periodic motions except for ....
   a. the movement of the Moon around the Earth. b. the pendulum motion.
   c. the projectiles motion. d. the light waves.
8. All of the following are electromagnetic waves except for the ....
   a. thermal (infrared) rays. b. visible light.
   c. sound waves. d. ultraviolet rays.

PART 1

Question 2

A What is meant by ... ?

1. Relative motion.

....

....

2. Periodic motion.

....

....

3. An object's weight is 60 N.

....

....

4. Inertia.

....

....

B Give reasons for :

1. Gravitational acceleration is changed on Earth's surface from a place to another.

....

2. An object's weight is changed from a place to another.

....

3. When a car stops suddenly, passengers are rushed forward.

....

C Give the scientific term :

1. An object's position changes as time passes from its initial position to a different final one. [..........................]
2. The amount of Earth's gravitational pull on an object. [..........................]

Model Exams on Unit TWO

Model Exam 1

20

Answer the following questions :

Question 1 5 marks

A The opposite figure shows the idea of working of a device :



1. What is the name of this device ?

....

2. What is the changes of energy in this device ?

....

3. What happens when you disconnected one end of the wire from the battery ? What do you conclude ?

....

B Choose the correct answer :

1. The movement of sound and light waves is .... motion.
   a. transitional b. vibrating c. circular d. wave
2. From harms of friction forces is ....
   a. stopping the car when using the brakes.
   b. landing slowly when using parachut.
   c. rising of blood in veins against gravity.
   d. increasing the temperature of gears of machines when operated a long time.

Question 2 5 marks

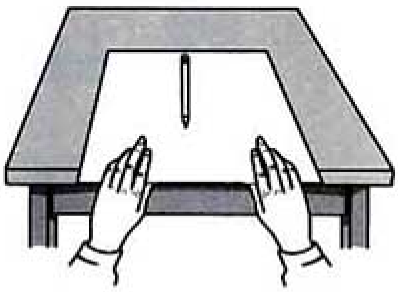
A Complete the following :

1. Friction is a resistant force originated between .... and ....
2. When an object transfers from the equator to the north pole, ... is changed, while .... remains fixed.
3. The violin and the guitar are among .... musical instruments, while flute and reed pipe are among .... musical instruments.

PART 1

B In the opposite figure :

What happens to the pen when pulling the paper quickly ?
(Give a reason)



....

....

Question 3 5 marks

A Write the scientific term :

1. The effect that attempts to change the object's state from being static to motion or vice versa. [..........................]
2. Waves produced due to the vibration of medium particles. [..........................]

B Give reasons for :

1. Infrared rays are used in cooking food.

....

2. Importance of nuclear force.

....

3. Spare parts of cars are covered with grease.

....

Question 4 5 marks

A Choose from column (B) what suits it in column (A) :

(A)	(B)
Type of motion	**Example**
1. Vibrating motion	a. motion of sound waves.
2. Circular motion	b. motion of a train from station to another.
3. Wave motion	c. movement of the Moon around the Earth.
	d. motion of the simple pednulum.

1. .... 2. .... 3. ....

B Put (✓) or (✗) :

1. Ultraviolet rays are used in examining mineral raws in industry. ( )
2. Dynamo changes the heat energy into electric energy. ( )
3. Passengers are rushed forward when the moving car stops suddenly. ( )
4. Earth's gravitational acceleration increases by approaching to the Earth's centre. ( )

Model Exam 2

...... / 20

Answer the following questions :

Question 1 — 5 marks

A What is meant by ... ?

1. Mechanical waves : ....
....
2. Inertia : ....
....
3. An object's weight is 80 N : ....
....

B Mention one use of each of the following :

1. Electric winches : ....
2. Weak nuclear force : ....
3. Gamma rays : ....
4. Visible light : ....

Question 2 — 5 marks

A Explain an activity to show the meaning of inertia practically.

....
....
....
....

B Choose the correct answer :

1. If you know that the Earth's gravitational acceleration is $9.8\ m/sec^2$, so the weight of an object its mass is 70 kg on Earth equals .... newton.
   a. 5.88 b. 58.8 c. 686 d. 885

PART 1

2. .... is the scientist who discovered the Earth's gravitational.

a. Planck b. Newton c. Archimeds d. Coulomb

Question 3 — 5 marks

A Give reasons for :

1. Sound needs a medium to travel through , while light travels through space.

....

2. Blood is pumped all over the body organs.

....

B Put (✓) or (✗) , then correct the wrong one :

1. The mass of a person at the equator is less than its mass at the two poles.
   ( ) ....
2. Brakes are from examples of forces inside living systems.
   ( ) ....
3. Object's weight = its mass + gravitational acceleration.
   ( ) ....

Question 4 — 5 marks

Compare between (two points only) :

1. Transitional motion and periodic motion.

Transitional motion	Periodic motion
....	....
....	....
....	....
....	....

2. Sound waves and light waves.

Sound waves	Light waves
....	....
....	....
....	....
....	....

UNIT THREE Earth and Universe

Lesson 1 Celestial Bodies

Worksheet 15

1. A. Complete the following statements :

1. The force of gravity between two objects in the space depends on............... and ....
2. The nearest planet to the Sun is .... and the farthest one from the Sun is ....
3. The galaxy that our solar system belongs to it is called .... or the way of ....

B. What is meant by ... ?

1. Galaxies : ....
2. Celestial body : ....
....

2. Compare between the inner planets and the outer planets :

Points of comparison	The inner planets	The outer planets
• Definition :	....	....
• Their arrangement from the Sun :	....	....
• Structure :	....	....
• Size :	....	....
• Density :	....	....
• No. of moons rotating around them :	....	....
• Atmosphere :	....	....

3. A. Give reasons for :

1. The density of outer planets is low.
....
2. Astronomers don't measure the distances between stars by kilometres.
....

B. Choose the correct answer :

1. Planets revolve around the Sun in .... paths.
a. circular b. elliptical c. spiral d. irregular

PART 1

2. In addition to the Sun, the solar system includes ....

a. eight planets only. b. asteroids, meteorites and comets only.

c. stars and planets. d. eight planets with the asteroids, meteorites and comets.

3. The planets rotates around the Sun by the effect of .... gravity.

a. Earth b. Sun c. Jupiter d. Moon

4. **A. Calculate the distance in light year between a star and the Sun, if the distance between them equals 75.736×10^{12} km.**

....

B. Write the scientific term for each of the following :

1. The distance covered by light in one year. [..........................]
2. The biggest body in the solar system. [..........................]

C. What is the importance of telescopes ? Mention their kinds.

....

....

Worksheet 16

1. **Write the scientific term :**

1. Luminous lines are formed in the sky due to the completely burning of small rocky masses in the Earth's atmosphere. [..........................]
2. The followers of the planets. [..........................]
3. The region which separates between the group of inner planets from the group of outer planets. [..........................]
4. The most famous comet which completes its revolution around the Sun each 76 years. [..........................]

2. **A. Put (✓) or (✗), then correct what is wrong :**

1. Comets revolve around the Sun in elongated elliptical orbits.

( ) ....

2. Asteroids'belt is located between the orbits of Earth and Mars.

( ) ....

B. Write short notes on comets.

....

....

....

....

3. Choose the correct answer :

1. .... planets haven't moons revolving around them.
   a. Uranus and Jupiter
   b. Mercury and Venus
   c. Earth and Mercury
   d. Venus and Mars
2. The mass of the biggest meteorite found up till now reaches .... tons.
   a. 100 b. 50 c. 80 d. 10
3. .... are rocky bodies of variable sizes and irregular shapes situated between Mars and Jupiter planets.
   a. Moons b. Galaxies c. Comets d. Asteroids
4. The planet which has the greatest number of moons revolving around it, is ....
   a. Neptune. b. Jupiter. c. Earth. d. Saturn.

4. Give reasons for :

1. The force of gravity on Jupiter planet is greater than any other planet.

....

....

2. The object's weight is changed from a planet to another.

....

....

UNIT THREE

Lesson 2 The Earth

Worksheet 17

1. Complete the following :

1. The average radius of Earth is about .... , while its mass is ....
2. The Earth's shape is completely circular accompanied with .... at the two poles and .... at the equator.
3. .... layer protects living organisms from harmful .... rays.
4. Earth planet occupies the .... order according to the distance from the Sun, where it is far from the Sun about .... km.
5. Green plants use .... gas in photosynthesis process.

2. A. What is the importance of ... ?

1. Nitrogen gas : ....
....
2. Oxygen gas : ....
....

B. Correct the underlined words :

1. The ratio of **oxygen** gas in air is about 78% of the air volume. [..........................]
2. The Earth revolves a complete revolution around the Sun within **24** days. [..........................]

3. Give reasons for :

1. The presence of a white colour surrounds the planet Earth.
....
2. Concerning the volume, the Earth occupies the medium position in the solar system.
....
....

4. Mention the characteristics of the planet Earth that support the continuity of life :

....
....
....
....

Worksheet 18

1. Compare between :

1. Salty water and fresh water :

Salty water	Fresh water
....	....
....	....
....	....
....	....

2. The inner core and the outer core :

Points of comparison	The inner core	The outer core
• Structure :	....	....
• Thickness :	....	....

2. What is the importance of water to plants and humans ?

....
....
....

3. Give reasons for :

1. Temperature on Earth's surface suits the life of living organisms.
....
2. The planet Earth is suitable for life.
....
....
3. Earth's inner core is rich in iron and nickel.
....
4. Steadfastness of the hydrosphere on the Earth's surface.
....

4. Choose the correct answer :

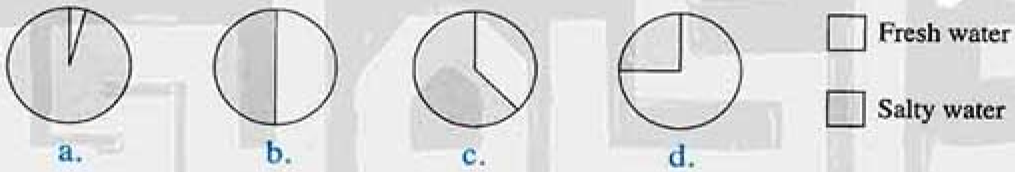
1. The Earth is characterized by the presence of a suitable .... of about 76 cm.Hg.
   a. gravity b. hydrosphere c. temperature d. air pressure
2. The light outer layer of the Earth is called ....
   a. crust. b. mantle. c. outer core. d. inner core.
3. The thickness of mantle layer is about .... km.
   a. 2270 b. 2858 c. 1216 d. 2885

PART 1

Worksheet 19 on Lessons 1 & 2

1. Choose the correct answer :

1. All of the following planets have an atmosphere except ....
   a. Mercury. b. Venus. c. Earth. d. Mars.
2. Most of the world map has a blue colour, because most of Earth planet is about ....
   a. snow. b. mountains. c. oceans. d. plains.
3. The tail of the comet is considered ....
   a. a gaseous cloud. b. rocky parts.
   c. solidified gases. d. dust and water molecules.
4. The figure that represents the area of fresh water compared with the area of salty water on Earth's surface is ....



2. What happens when .... ?

1. The planet becomes nearer to the Sun
....
2. The air contains oxygen gas and is free of nitrogen gas.
....
....
3. Friction of meteors with Earth's atmosphere.
....
....
4. Absence of ozone layer in the atmosphere.
....
....

What are the following numbers indicate ?

1. 12 moons : ....
2. 3.78 m/sec^2. : ....
3. 2100 km approximately : ....
4. 8 - 60 km approximately : ....
5. 6386 km approximately : ....
6. 29 % : ....

Complete the following :

1. Inner planets are .... bodies, while outer planets are .... bodies.
2. Water bodies represent about .... % of Earth's surface.
3. The followers of planets are called ....
4. The biggest planet in the solar system is ...., while the smallest one is ....

UNIT THREE

Lesson 3 Rocks and Minerals

Worksheet 20

1. A. Write the scientific term :

1. A thin non-compacted layer which covers the Earth's crust. [..........................]
2. A very hot thick liquid underneath the Earth's crust. [..........................]
3. A natural solid material exists in the Earth's crust and is formed of one mineral or a group of minerals. [..........................]

B. Complete the following table :

Points of comparison	Granite	Basalt
1. Colour :	....	....
2. Minerals forming it :	....	....
3. Found in :	....	....

2. Complete the following :

1. Rocks are classified according to their way of formation into .... rocks, ... rocks and .... rocks.
2. Igneous rocks are divided according to the place of their formation into .... rocks and .... rocks.
3. The crystals of minerals that form the volcanic rocks are .... -sized.
4. When magma extruded to the Earth's surface in the form of .... , it is called ....
5. .... is an example of plutonic igneous rocks, while .... is an example of volcanic igneous rocks.

3. Give reasons for :

1. The plant roots extend easily through the upper part of the Earth's crust.

....

2. The crystals of minerals that form the plutonic rocks are large-sized.

....

....

3. The crystals of minerals that form the surface rocks are small-sized.

....

....

4. Volcanic rocks contain small circular holes.

....

....

4. Rewrite the following statements after correcting them :

1. Sedimentary rocks are formed of molten material called magma.

....

2. Solid basis is formed of mineral substance, water, air, decayed organic materials and plant roots.

....

3. Volcanic rocks are formed inside the Earth's crust at great depths.

....

4. Basalt is heavy, rough, solid, cohesive and it isn't easily broken.

....

Worksheet 21

1. What happens when ... ?

1. Adding dilute hydrochloric acid to limestone.

....

2. Sedimentary rocks are subjected to pressure and high temperature.

....

3. Precipitation of calcium carbonate in lime solution.

....

2. Complete the following :

1. .... and .... are examples of sedimentary rocks, while .... is an example of metamorphic rocks.
2. The formation of sedimentary rocks undergoes three stages which are .... , ... and ....
3. Limestone has a .... colour and .... texture, while sandstone has a .... colour and .... texture.

4. The sedimentary layers in the bottom are the .... , while the above ones are the more ....

3. A. Write the scientific term :

1. A kind of rocks which wraps about 75% of the surface of the Earth's solid mass.

[..........................]

2. A rock produced by the conversion of limestone and it has a coarse texture.

[..........................]

3. A rock formed of sand grains which are less than 2 mm in diameter.

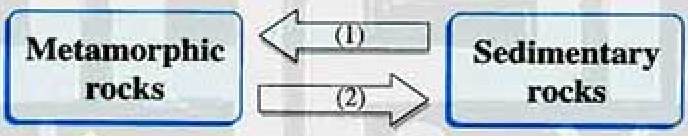
[..........................]

B. Put (✓) or (✗), then correct the wrong ones :

1. Sandstone has more solidity than limestone.
( ) ....

2. The main mineral that forms limestone is quartz.
( ) ....

4. Complete the following diagram, then mention an example for a metamorphic rock :



General Exercise of the School Book on Unit THREE

Question 1

Give the scientific term for each of the following :

1. A molten material exists at depths beneath the crust. [..........................]
2. A rock formed of lava flows when it comes on the Earth's surface. [..........................]
3. The rocky masses that fall from the space and reach the Earth's surface. [..........................]

Question 2

Complete the following :

1. Planets revolve around the Sun in .... orbits, which lie in .... to the Sun's axis of rotation.
2. Granite consists of .... , ... and .... minerals, while basalt consists of .... , ... and .... minerals.
3. The planet Earth occupies the .... position in the solar system in view of the volume, regarding the density it occupies .... position, and concerning the force of gravity on its surface it occupies the .... position.

Question 3

Give reasons for :

1. Some rocky masses that fall from space do not reach the Earth's surface.
....
2. The plutonic igneous rocks are characterized by the presence of large-sized mineral crystals that can be seen by naked eye.
....
3. The Earth's inner core is rich in iron and nickel.
....

Question 4

Choose the correct answer :

1. Water bodies on Earth's surface form the percentage of ....
   a. 50 % b. 71 % c. 40 % d. 30 %
2. The metamorphic rock is produced as a result of the effect of the heat and pressure on the .... rocks.
   a. igneous only
   b. sedimentary only
   c. metamorphic only
   d. igneous and sedimentary

PART 1

3. The telescope is used to study the ....

a. minerals. b. earthquakes. c. celestial bodies. d. volcanoes.

Question 5

Compare between each of the following :

1. The crust and the mantle.

The crust	The mantle
....	....
....	....
....	....
....	....

2. Sandstone rock and limestone rock.

Sandstone rock	Limestone rock
....	....
....	....
....	....
....	....

3. The comets and the meteors.

The comets	The meteors
....	....
....	....
....	....
....	....

Question 6

If you and your classmates made a trip in the space to the planet Mars, and play the basketball game there. Is it easier for you to jump towards the basket and put the ball inside than you play on Earth's surface ?

Explain your answer in the light of your previous study.

....

....

Model Exams on Unit THREE

Model Exam 1

20

Answer the following questions :

Question 1 — 5 marks

A Put (✓) or (✗) :

1. The acceleration due to gravity on Saturn planet is less than that on Earth planet. ( )
2. The Earth rotates around the Sun by the effect of inertia forces. ( )
3. A sedimentary rock can change into another sedimentary rock by passing time. ( )
4. The polar radius is larger than the tropical radius. ( )

B Give reasons for :

1. Plutonic rocks have coarse texture, while volcanic rocks have smooth texture.

....

....

2. Iron and nickel elements are collected around the centre of the Earth.

....

....

3. The gases forming the outer planets are found in a solidified state.

....

....

Question 2 — 5 marks

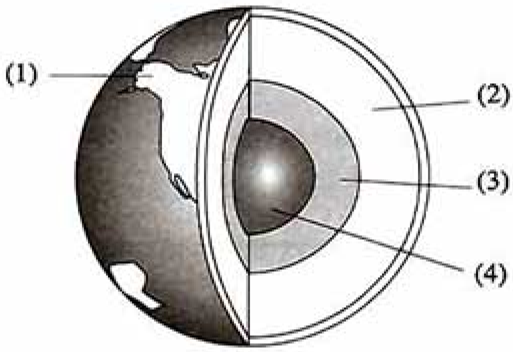
A Look at the opposite figure, then label it :

(1) ....

(2) ....

(3) ....

(4) ....



PART 1

B Write the number indicating each of the following :

1. The distance between the Earth planet and the Sun. [..........................]
2. The normal atmospheric pressure. [..........................]
3. The density of outer planets. [..........................]
4. Number of moons of inner planets group. [..........................]

C Choose the correct answer :

1. The big-sized, less dense planet which consists of gaseous elements is ....
   a. Earth. b. Mercury. c. Jupiter. d. Venus.
2. Water bodies on Earth's surface form about ....
   a. 50 % b. 71 % c. 40 % d. 29 %

Question 3 5 marks

A What do you expect in the following cases if .... ?

1. The Earth occupies the second order according to the distance from the Sun.
   ....
   ....
2. There is no carbon dioxide in the atmosphere.
   ....

B Complete the following :

1. .... is from sources of salty water, while .... is from sources of fresh water.
2. Planets revolve around the Sun in .... orbits which lie in a plane .... to the Sun's axis of rotation.
3. .... is a very hot thick fluid underneath Earth's crust and when it is extruded to the Earth's surface in the form of .... it is called ....
4. The atmospheric envelope appears as a .... colour around the Earth, while the blue colour represents the ....
5. The galaxy that our solar system belongs to is the ....

Question 4 5 marks

Choose from column (B) and (C) what is suitable for column (A) :

(A)	(B)	(C)
1. Comet	a. A sedimentary rock.	A. To measure the universal distances.
2. Galaxy	b. A fracture in the outer core	B. The main component is quartz mineral.
3. Sandstone	c. A unit that forms the universe	C. Its origin is from limestone.
4. Marble	d. A white pure metamorphic rock.	D. Tremendous collection of stars.
5. Basalt	e. A volcanic igneous rock.	E. Is formed of olivine, pyroxene and feldspar minerals.
	f. It consists of yellow small granules from basic minerals.	F. Is consisted of head and tail.
	g. It rotates around the Sun in orbits intersecting with the planets' orbits.	G. Its origin is from molten materials after hardening.

Model Exam 2

20

Answer the following questions :

Question 1 5 marks

A What is meant by ... ?

1. The light year : ....

....

2. The belt of wanderer asteroids : ....

....

3. Sedimentary rocks : ....

....

B Correct the underlined words :

1. Green plants use **nitrogen** gas in photosynthesis process. [..........................]

2. On adding dilute hydrochloric acid to **sandstone**, an effervescence of carbon dioxide gas evolves. [..........................]

PART 1

3. **Comets** are the greatest units that form the universe. [..........................]

4. **Plutonic** rocks contain small circular holes. [..........................]

Question 2 — 5 marks

A Mention the main minerals that share in the structure of the following rocks :

1. Granite : ....
2. Basalt : ....
3. Limestone : ....
4. Sandstone : ....

B Compare between meteors and meteorites :

Meteors	Meteorites
....	....
....	....
....	....
....	....
....	....
....	....

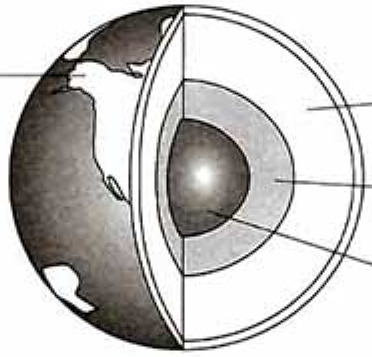
Question 3 — 5 marks

Complete the following :

1. Formation of sedimentary rocks takes place in three stages which are .... , ... and ....
2. .... gas enters in formation of proteins and it represents about .... of the air volume.
3. .... layer protects living organisms from harmful .... rays.
4. .... rocks originate from fragmentation of old rocks, while .... rocks originate from exposing the igneous or sedimentary rocks to pressure and high temperature.
5. The number of planets that revolve around the Sun is ....

Question 4 — 5 marks

A **The opposite figure represents the layers of Earth. Mention the number of the layer which :**



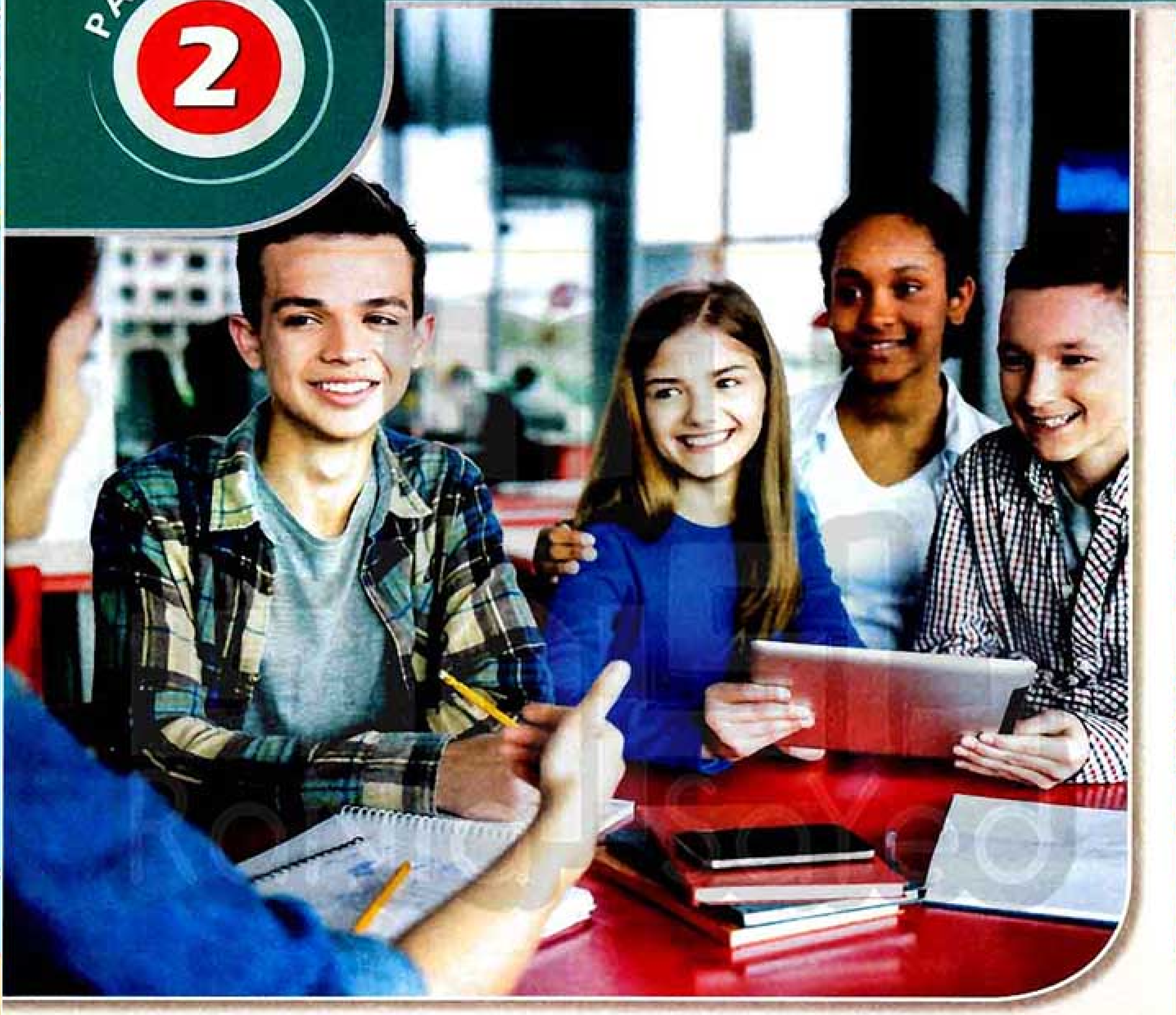
1. Its thickness is about 2100 km : ....
2. Its upper part is fragmented : ....
3. Its radius is about 1350 km : ....

B **Give reasons for :**

1. Temperature on the Earth's surface suits the life of living organisms.
....
....
2. The density of outer planets is low.
....
....
3. Limestone consists of mineral calcite.
....
....

Final Revision

PART 2



Final Revision on :

Unit One : Chemical Reactions.

Unit Two : Force and Motion.

Unit Three : Earth and Universe.

Final Revision on Unit 1

1 Definitions (or scientific terms) :

1. Metals :	They are the elements which have less than four electrons in the outermost shell and have luster, they are good conductors of heat and electricity, malleable and ductile.
2. Nonmetals :	They are the elements which have more than four electrons in the outermost shell and have no luster, they are bad conductors of heat and electricity (except graphite), not malleable or ductile.
3. Positive ion :	It is an atom of a metallic element that loses an electron or more during the chemical reaction.
4. Negative ion :	It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.
5. Ion :	It is the atom which loses or gains an electron or more during the chemical reaction.
6. Noble (inert) gases :	They are the elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.
7. Ionic bond :	It is a chemical bond resulted from the electric attraction between a positive ion and a negative ion.
8. Covalent bond :	It is a chemical bond formed between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.
9. Single covalent bond :	It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with one electron.
10. Double covalent bond :	It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with two electrons.
11. Triple covalent bond :	It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with three electrons.
12. Valency :	It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
13. Atomic group (radical) :	It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, has its own valency and it is not existed solely (individually).
14. Chemical formula :	It is a formula that represents the number and the type of atoms in a molecule.
15. Acids :	They are substances dissociate in water producing positive hydrogen ions.

PART 2

16. Bases :	They are substances dissociate in water producing negative hydroxide ions.
17. Oxides :	They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
18. Metal oxides :	They are compounds produced from the combination of oxygen with a metal.
19. Nonmetal oxides :	They are compounds produced from the combination of oxygen with a nonmetal.
20. Salts :	They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).
21. Chemical reaction :	It is the breaking of the existing bonds between the atoms of the molecules in the reactants and forming new bonds between the atoms of the molecules in the products.
22. Chemical equation :	It is a set of symbols and chemical formulae representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction as well.
23. The balanced chemical equation :	It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.
24. Law of conservation of matter (mass) :	The sum of reactants masses in any chemical reaction equals the sum of products masses.
25. Law of constant ratios :	The chemical compound is formed from combination of its elements by constant weight ratios.
26. Direct combination reactions :	They are the reactions which involve a combination of two or more substances to form a new compound.

2 Give reasons for :

1. **The number of electrons of an ion differs from that of its atom.**
   Because the number of electrons in ion is less than or more than its number in the same atom by the number of lost or gained electrons.
2. **The electric wires are manufactured of copper.**
   Because copper is a metal which is a good conductor of electricity.
3. **When an atom gives an electron or more, it becomes a positive ion.**
   Because the number of electrons becomes less than the number of protons.
4. **When an atom gains an electron or more, it becomes a negative ion.**
   Because the number of electrons becomes more than the number of protons.
5. **The number of energy levels in the ion of a metallic element is less than the number of energy levels in its atom.**
   Because the atom of a metallic element loses the outermost electrons forming a positive ion.

6. A sodium atom ($_{11}Na$) tends to form a positive ion, while oxygen atom ($_{8}O$) tends to form a negative ion.
Because sodium atom loses its outermost electron and changes into positive ion, while oxygen atom gains two electrons to complete its outermost level and changes into a negative ion.

7. Noble gases don't participate in chemical reactions under the ordinary conditions.
Due to the completeness of their outermost energy levels with electrons.

8. Both sodium ion and oxygen ion have the same number of electrons.
Because sodium ion is formed when sodium atom loses one electron and changes into (Na^{+}) which contains 10 electrons, while oxygen ion is formed when oxygen atom gains two electrons and changes into (O^{-2}) which contains 10 electrons too.

9. It is impossible to combine sodium and magnesium together to form a compound.
Because each of them is a metal, its atom tends to lose the outermost electrons during chemical reactions.

10. The bond in magnesium oxide (MgO) molecule is an ionic bond [regarding that the atomic number for magnesium (Mg) = 12 and oxygen (O) = 8].
Because magnesium loses two electrons and changes into positive ion, while oxygen gains the two electrons (which are lost by magnesium) and changes into negative ion, then electric attraction occurs between positive and negative ions.

11. Ionic bonds produce compounds only not elements, but the covalent bonds produce both types, an element or even a compound.
Because ionic bond arises between two different atoms (metal and nonmetal) as a result of the electric attraction between a positive ion of an atom of a metallic element and a negative ion of an atom of a nonmetallic element, while covalent bond arises between two similar or different nonmetal atoms.

12. When an atom of chlorine ($_{17}Cl$) is joined with an atom of sodium ($_{11}Na$), the product will be an ionic compound, but when two atoms of chlorine are joined together, the product will be a covalent molecule.
Because chlorine atom (nonmetal) gains the electron which is lost by sodium atom, so an electric attraction occurs between positive sodium ion and negative chloride ion, while each of the two chlorine atoms share with one electron to complete its outermost shell.

13. The bond in a hydrogen molecule is a single covalent bond.
Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable.

14. The bond in an oxygen molecule is a double covalent bond.
Because it arises by sharing each oxygen atom with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

PART 2

15. The bond in water molecule is a single covalent bond.
Because oxygen atom shares with two electrons, while each hydrogen atom shares with one electron only to become the outermost shell for each of them completed with electrons.

16. The bond in nitrogen ($_7N$) molecule is a triple covalent bond.
Because it arises by sharing each nitrogen atom with three electrons to complete its outermost shell with 8 electrons and becomes more stable.

17. Potassium ($_{19}K$) is monovalent, while oxygen ($_8O$) is divalent.
Because during chemical reactions, potassium atom loses one electron, while oxygen gains or shares with two electrons to complete their outermost shell.

18. Both sodium ($_{11}Na$) and chlorine ($_{17}Cl$) are monovalent although they have different atomic numbers.
Because during chemical reactions, sodium atom loses one electron, while chlorine atom gains or shares with one electron to complete their outermost shell.

19. The valency of noble gases is zero.
Because their outermost energy levels are completely filled with electrons so they don't lose, gain or share with any electrons.

20. Magnesium ($_{12}Mg$) is divalent, while aluminium ($_{13}Al$) is trivalent.
Because during chemical reactions, magnesium atom loses two electrons, while aluminium atom loses three electrons.

21. Both nitrate and carbonate groups have the same number of atoms, but differ in their valencies.
Because nitrate group $(NO_3)^-$ consists of four atoms and it is a monovalent group, while carbonate group $(CO_3)^{-2}$ consists of four atoms but it is a divalent group.

22. Both nitrite and nitrate groups differ in the number of atoms and having the same valency.
Because both are monovalent but nitrate $(NO_3)^-$ group consists of 4 atoms, while nitrite $(NO_2)^-$ group consists of 3 atoms.

23. An oxygen atom joins two atoms of sodium when composing one molecule of sodium oxide.
Because oxygen is a divalent, while sodium is a monovalent.

24. The chemical formula of sodium carbonate is (Na_2CO_3).
Because sodium is a monovalent, while carbonate is a divalent group so two atoms of sodium combine with one atom of carbonate group.

25. The chemical formula of water is (H_2O).
Because oxygen is divalent, while hydrogen is monovalent, so two atoms of hydrogen combine with one atom of oxygen.

26. Acids have an effect on litmus paper which is different from bases.
Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue.

27. All acids turn the colour of litmus into red and having a sour taste, while all bases turn the colour of litmus into blue with a bitter taste.

Because acids when dissolved in water produce positive hydrogen ions H^+ which responsible for their properties, while bases when dissolved in water produce negative hydroxide ions $(OH)^-$ which responsible for their properties.

28. We can obtain sodium chloride (NaCl) solution and not silver chloride (AgCl) solution.

Because sodium chloride is water soluble salt, while silver chloride is water insoluble salt.

29. Caustic soda is from bases, while lead bromide is from salts.

Because caustic soda contains negative hydroxide ion, while lead bromide is formed from combination of positive metal ion with negative nonmetal ion.

30. A white powder is formed when a magnesium ribbon is burned in air.

Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium.

31. A chemical equation should be balanced.

To achieve the law of conservation of matter (mass).

32. The mass of magnesium is increased when it is burned.

Because it combines with oxygen forming magnesium oxide.

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$

33. White clouds are formed when ammonia gas reacts with conc. hydrochloric acid.

Due to the formation of ammonium chloride as white clouds.

$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$

34. Chemical reactions play an important role in our life.

Because through which, it is possible to :

- Obtain electric and heat energies used in some industries.
- Obtain more useful substances from less used substances.
- Prepare thousands of compounds are commonly used in many industries such as : manufacture of medicines, fertilizers, fuel, plastics, car batteries and food industries.

35. The use of chemical reactions is considered a double-edged weapon.

Because some of them play a vital role in our life, while others have negative effects on both human beings and environment.

36. Burning of fuel is among the reactions that pollute the environment.

Because it produces a lot of harmful gases that affect on humans and environment such as carbon, sulphur and nitrogen oxides.

37. CO_2 gas acts as a greenhouse effect.

Because it prevents the penetration of the thermal rays produced from the Earth to outer space.

38. Smoking is very harmful to health.
Because it causes lung cancer.

39. The spread of cancer tumors increases in the country that use coal as fuel.
Because its burning causes air pollution with poisonous substances that infect humans with lung cancer.

40. Burning of coal and cellulose fibers has bad effect.
Because it causes air pollution and lung cancer.

41. Carbon monoxide is a dangerous gas.
Because it causes headache, fainting, severe stomach-aches and may lead to death.

42. Sulphur oxides cause respiratory system malfunction and building corrosion.
Because they are acidic gases.

43. Nitrogen oxides affect the nervous system and the eye.
Because they are poisonous acidic gases.

3 What happens when ... ?

1. You hammer on a piece of carbon and why ?
It will be fragmented easily, because carbon is from nonmetals which are not malleable.

2. An atom loses one electron or more.
It changes into a positive ion carries a number of positive charges equals to the number of given electrons.

3. An atom gains one electron or more.
It changes into a negative ion carries a number of negative charges equals to the number of gained electrons.

4. An oxygen atom combines with a magnesium atom.
Magnesium loses two electrons and changes into a positive ion and oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions to form a molecule of magnesium oxide.

5. A chlorine atom combines with hydrogen atom.
Each atom shares with one electron to become the outermost shell of each of them completed with electrons.

6. Two oxygen atoms combine together.
Each oxygen atom shares with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

7. Burning a magnesium ribbon in air.
A white powder of magnesium oxide is formed.
[$2Mg + O_2 \xrightarrow{\Delta} 2MgO$ (white powder)].

8. Approaching a wet rod with hydrochloric acid to ammonia gas.
White clouds of ammonium chloride are formed.
[$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$ (white clouds)].

9. **Burning a piece of coal in air.**
Carbon dioxide compound is formed.
$[C + O_2 \xrightarrow{\Delta} CO_2]$

10. **The ratio of CO_2 gas increases in air.**
The temperature of air increases.

11. **Burning of coal and cellulose fibres.**
It causes air pollution and lung cancer.

4 Comparisons :

1 Comparison between the atom and the ion :

The atom	The ion
1. It is electrically neutral in its ordinary state.	1. It is positive or negative electric charge.
2. The number of electrons equals the number of protons.	2. The number of electrons is more or less than the number of protons.
3. Its outermost energy level is not completely filled with electrons except atoms of noble gases.	3. Its outermost energy level is completely filled with electrons.

2 Comparison between metals and nonmetals :

P.O.C.	Metals	Nonmetals
1. Physical state :	They are solids [except mercury (Hg) which is a liquid].	They are solids and gases [except bromine (Br) which is a liquid].
2. Metallic luster :	They have metallic luster.	They have no luster.
3. Malleable & ductile :	They are malleable and ductile.	They are not malleable or ductile.
4. Electric & heat conduction :	They are good conductors of heat and electricity.	They are bad conductors of heat and electricity. [except graphite which is a good conductor of electricity].
5. No. of electrons in outer shell :	They have less than (4) electrons in the outermost energy level.	They have more than (4) electrons in the outermost energy level.
6. Behaviour of atoms during the chemical reaction :	During the chemical reaction, their atoms tend to lose an electron or more and change into positive ions.	During the chemical reaction, their atoms tend to gain an electron or more and change into negative ions.

PART 2

3 Comparison between a positive ion and a negative ion :

Positive ion	Negative ion
1. It is an atom of a metallic element that loses an electron or more during the chemical reaction.	1. It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.
2. It carries a number of positive charges equals to the number of the lost electrons.	2. It carries a number of negative charges equals to the number of the gained electrons.
3. The number of its electrons is less than the number of protons.	3. The number of its electrons is more than the number of protons.
4. The number of its energy levels is less than that of its atom.	4. The number of its energy levels is equal to that of its atom.

4 Comparison between an ionic bond and a covalent bond :

Ionic bond	Covalent bond
1. It arises between metal and nonmetal elements.	1. It arises between two nonmetal elements.
2. It is formed by losing and gaining of electrons.	2. It is formed by sharing of one pair of electrons or more.
3. It is formed between two atoms of two different elements.	3. It may be formed between two atoms of the same or different elements.
4. It is formed due to the electrical attraction between the positive and negative ions.	4. It is formed due to sharing of electrons between the atoms.
5. It has one type.	5. It has three types (single, double and triple).
6. It produces compounds molecules only.	6. It produces elements and compounds molecules.

5 Comparison between single, double and triple covalent bonds :

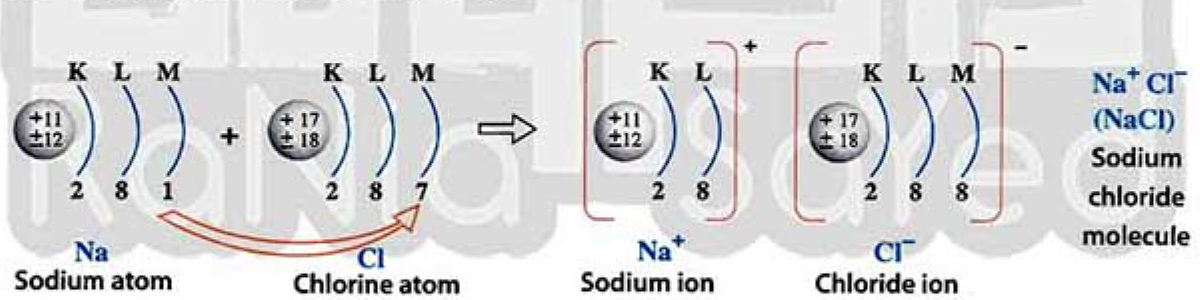
Single covalent bond (–)	Double covalent bond (=)	Triple covalent bond (≡)
- It is a chemical bond arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares with one electron. *Ex.* : Hydrogen molecule (H – H)	- It is a chemical bond arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares with two electrons. *Ex.* : Oxygen molecule (O = O)	- It is a chemical bond arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares with three electrons. *Ex.* : Nitrogen molecule (N ≡ N)

6 Comparison between acids and bases :

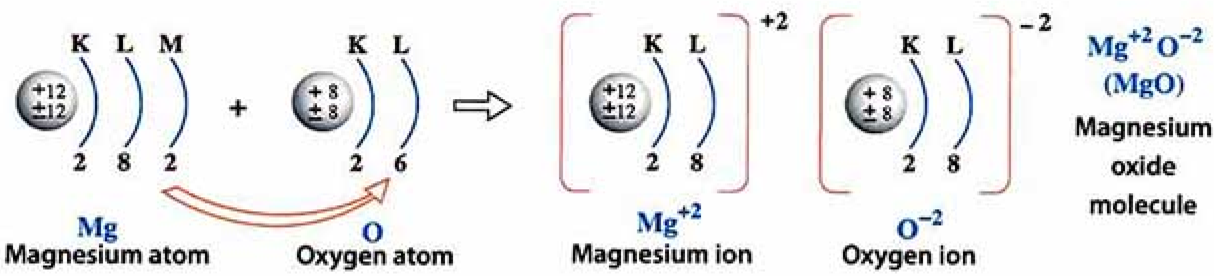
P.O.C.	Acids	Bases
1. Definition :	They are substances which dissociate in water producing hydrogen ions H^+.	They are substances which dissociate in water producing hydroxide ions $(OH)^-$.
2. Symbol :	The symbol of all the mineral acids begins with hydrogen H.	The symbol of all alkalis ends with (OH) group.
3. Taste :	They have a sour taste.	They have a bitter taste.
4. Affecting on litmus paper :	They change the colour of litmus paper into red due to the presence of hydrogen ions H^+.	They change the colour of litmus paper into blue due to the presence of hydroxide ions $(OH)^-$.
5. Examples :	H_2SO_4 & HCl	NaOH & $Ca(OH)_2$

5 Some ionic molecules :

1. Sodium chloride molecule (NaCl):

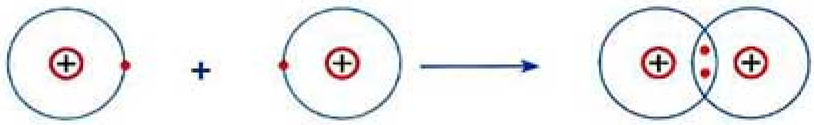


2. Magnesium oxide molecule (MgO):



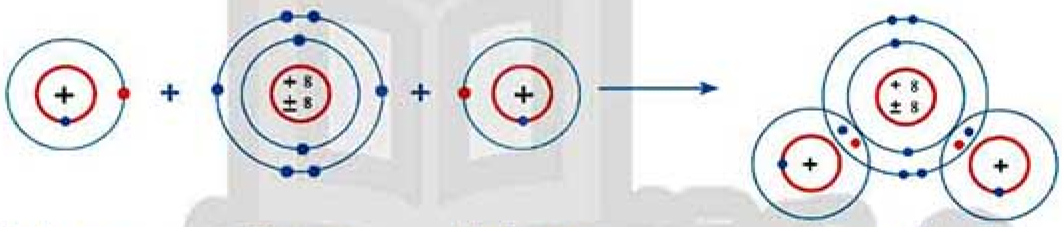
6 Some covalent molecules :

1. Hydrogen molecule (H_2) :



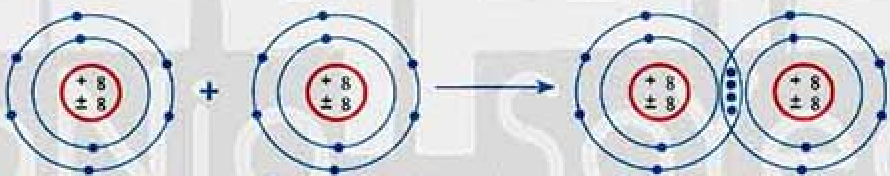
Hydrogen atom (^1_1H) + Hydrogen atom (^1_1H) → Hydrogen molecule (H – H) or (H_2)

2. Water molecule (H_2O) :



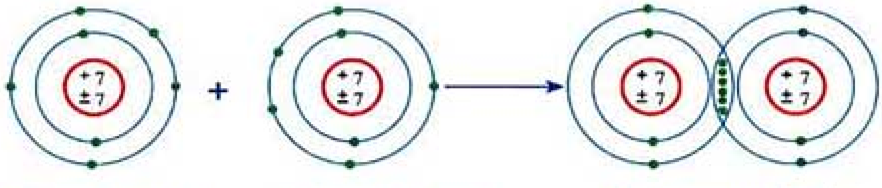
Hydrogen atom (^1_1H) + Oxygen atom ($^{16}_8O$) + Hydrogen atom (^1_1H) → Water molecule (H – O – H) or H_2O

3. Oxygen molecule (O_2) :



Oxygen atom ($^{16}_8O$) + Oxygen atom ($^{16}_8O$) → Oxygen molecule (O = O) or (O_2)

4. Nitrogen molecule (N_2) :



Nitrogen atom ($^{14}_7N$) + Nitrogen atom ($^{14}_7N$) → Nitrogen molecule (N ≡ N) or (N_2)

7 Some metallic and nonmetallic elements and their valencies :

Metallic element		Valency
Lithium	(Li)	Monovalent (1)
Potassium	(K)	
Sodium	(Na)	
Silver	(Ag)	
Copper I	(Cu)	
Calcium	(Ca)	Divalent (2)
Magnesium	(Mg)	
Iron II	(Fe)	
Lead	(Pb)	
Copper II	(Cu)	
Mercury	(Hg)	
Zinc	(Zn)	
Aluminium	(Al)	Trivalent (3)
Gold	(Au)	
Iron III	(Fe)	

Nonmetallic element		Valency
Hydrogen	(H)	Monovalent (1)
Chlorine	(Cl)	
Fluorine	(F)	
Bromine	(Br)	
Iodine	(I)	
Sulphur	(S)	Divalent (2)
Oxygen	(O)	
Nitrogen	(N)	Trivalent (3)
Phosphorus	(P)	
Sulphur	(S)	Tetravalent (4)
Carbon	(C)	
Nitrogen	(N)	Pentavalent (5)
Phosphorus	(P)	
Sulphur	(S)	Hexavalent (6)

8 Some atomic groups and their valencies :

Atomic group	Valency	Atomic group	Valency	Atomic group	Valency
Hydroxide $(OH)^-$ Bicarbonate $(HCO_3)^-$ Nitrate $(NO_3)^-$ Nitrite $(NO_2)^-$ Ammonium $(NH_4)^+$	Monovalent (1)	Carbonate $(CO_3)^{-2}$ Sulphate $(SO_4)^{-2}$	Divalent (2)	Phosphate $(PO_4)^{-3}$	Trivalent (3)

PART 2

9 Types of compounds and their examples :

Types of compounds	Examples	Chemical formula	No. of elements forming the molecule	No. of atoms in the molecule
Acids	• Hydrochloric acid	HCl	2	2
	• Nitric acid	HNO_3	3	5
	• Sulphuric acid	H_2SO_4	3	7
Bases	• Sodium hydroxide	$NaOH$	3	3
	• Potassium hydroxide	KOH	3	3
	• Calcium hydroxide	$Ca(OH)_2$	3	5
	• Aluminium hydroxide	$Al(OH)_3$	3	7
	• Ammonium hydroxide	NH_4OH	3	7
Oxides	• Sodium oxide	Na_2O	2	3
	• Calcium oxide	CaO	2	2
	• Aluminium oxide	Al_2O_3	2	5
	• Magnesium oxide	MgO	2	2
	• Carbon dioxide	CO_2	2	3
	• Sulphur trioxide	SO_3	2	4
Salts	• Sodium carbonate	Na_2CO_3	3	6
	• Copper carbonate	$CuCO_3$	3	5
	• Calcium carbonate	$CaCO_3$	3	5
	• Sodium sulphate	Na_2SO_4	3	7
	• Aluminium sulphate	$Al_2(SO_4)_3$	3	17
	• Sodium nitrate	$NaNO_3$	3	5
	• Copper nitrate	$Cu(NO_3)_2$	3	9
	• Sodium phosphate	Na_3PO_4	3	8
	• Aluminium phosphate	$AlPO_4$	3	6

10 Chemical equations :

1. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
2. $C + O_2 \xrightarrow{\Delta} CO_2$
3. $H_2 + Cl_2 \longrightarrow 2HCl$
4. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
5. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$
6. $2NO + O_2 \longrightarrow 2NO_2$

11 Negative effects of chemical reactions :

1 Burning of coal and cellulose fibres :

Such as burning paper and cigarettes cause air pollution and lung cancer.

2 Fuel burning :

It is an example of environmental pollution due to the presence of harmful gases sush as:

A. Carbon oxides:

a. *Carbon monoxide (CO)* has a dangerous impact on the human being which causes :

- Headache.
- Fainting.
- Severe stomach-aches and may lead to death.

b. *Carbon dioxide (CO_2)* acts as a **greenhouse.**

- Increasing the ratio of carbon dioxide in the atmospheric air leads to **increasing the air temperature**.

B. Sulphur oxides :

Such as : a. Sulphur dioxide (SO_2).

b. Sulphur trioxide (SO_3).

- They are acidic gases that cause :
  - Respiratory system malfunction (breathing problems).
  - Building corrosion.

C. Nitrogen oxides :

- They are acidic gases that are resulted from fuel burning during the time of lightning.
- They are poisonous acidic gases that affect the nervous system and the eye.

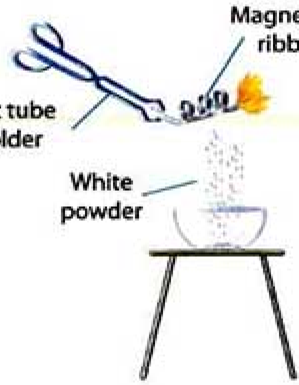
PART 2

12 Activities :

ACTIVITY 1 To understand the concept of chemical reaction :

Steps :

- Hold a piece of magnesium ribbon by a test tube holder.
- Burn the ribbon in air.



Observation :

The solid magnesium ribbon burns and changes from a bendable bright solid into a white powder of a new substance.

Conclusion :

Magnesium reacts with atmospheric oxygen (reactants) to form a new substance which is magnesium oxide (Product).

Magnesium + *Oxygen* $\xrightarrow{\Delta}$ *Magnesium oxide*

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$ *(white powder)*

(Reactants) *(Product)*

ACTIVITY 2 To show the combination between ammonia gas (compound) and hydrochloric acid (compound) :

Step :

Place a glass rod wet with conc. hydrochloric acid (HCl) close to the mouth of a test tube containing ammonia solution.



Observation :

White clouds of ammonium chloride (NH_4Cl) are formed.

Conclusion :

Ammonia gas (NH_3) [evolves from ammonia solution] combines with hydrochloric acid (HCl) to give ammonium chloride (NH_4Cl) (white clouds).

Ammonia + Hydrochloric acid $\xrightarrow{\text{Conc.}}$ *Ammonium chloride*

$NH_3 + HCl \xrightarrow{\text{Conc.}} NH_4Cl$ *(white clouds)*

(compound) *(compound)* *(compound)*

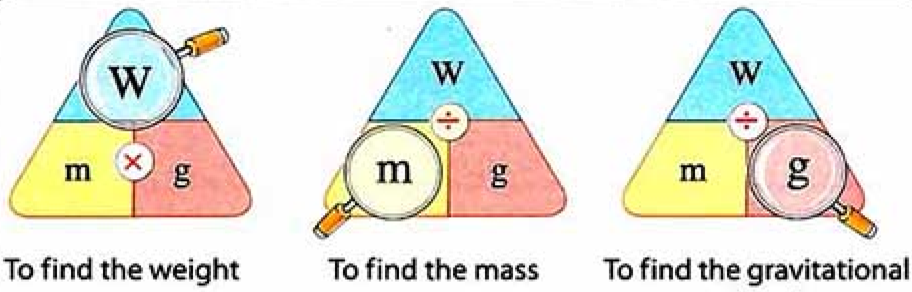
Final Revision on Unit 2

1 Definitions (or scientific terms) :

Term	Definition
1. Force :	It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.
2. Object's weight :	• It is the ability of the Earth to attract that object to its centre. • It is the force of Earth's gravitational to the object.
3. Object's centre of gravity :	It is the effective point that is located at the centre of the object at which the force of gravity affects the object.
4. Inertia :	It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
5. Friction forces :	They are resistant forces (against motion) originated between the object in motion and the medium touching it.
6. Biological forces :	They are forces inside living systems that enable living organisms to do their different biological operations.
7. Speed :	It is the distance covered by an object in a unit time.
8. Relative motion :	It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.
9. The reference point :	It is a fixed point used to determine the object's position or to describe its movement.
10. Transitional motion :	It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final positions.
11. Periodic motion :	It is a motion which is regularly repeated at equal periods of time.
12. Mechanical waves :	They are waves produced due to the vibration of medium particles and they need a medium to transfer through.
13. Electromagnetic waves :	They are waves which are accompanied by electromagnetic forces and they spread in all media and free space.

2 Law and solved problems :

Object's weight (W) = Object's mass (m) × Earth's gravitational acceleration (g)
"Newton" "kg" "$9.8 \simeq 10$ m/sec^2"



To find the weight — To find the mass — To find the gravitational acceleration

PART 2

Problem 1 *Find the weight of an object of 10 kg. (Knowing that the Earth's gravitational acceleration is 9.8 m/sec^2).*

Solution

$W = m \times g = 10 \times 9.8 = 98$ newton.

Problem 2 *Calculate the mass of an object, if its weight is 280 newton (Knowing that the Earth's gravitational acceleration is 10 m/sec^2).*

Solution

Object's weight = Mass × Earth's gravitational acceleration

$$\text{Mass} = \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}} = \frac{280}{10} = 28 \text{ kg.}$$

3 Importance or uses :

Item	Importance (or uses)
1. Electromagnet :	**It is used in making of :** • Electric winches which lift scrap iron and cars in ports. • Electric bells.
2. Electric generator (Dynamo) :	It converts the mechanical energy into electric energy.
3. Electric motor :	It converts the electric energy into mechanical energy.
4. Weak nuclear force :	**It is used to get radioactive elements and radiations which are used in :** • Medicine. • Scientific researches. • Industry.
5. Strong nuclear force :	**It is used in :** • Producing electricity. • Military purposes.

4 Technological applications :

1 Technological applications of sound mechanical waves :

- Examining and curing sets for the human body using sound waves (ultrasonic waves).
- Musical instruments :
  a. **Stringed musical** instruments (contain strings) such as : the violin, the lute and the guitar.
  b. **Pneumatic musical** instruments such as : flute or reed pipe.
  c. Amplifiers and sets of distributing and controlling sound used in broadcasting studios.

2 Technological applications of electromagnetic waves :

1. Infrared (IR) rays :	**They are used in :** • night vision apparatus used by modern military forces. • remote sensing instrument to photograph Earth's surface using satellites. • cooking food. • making remote sets.
2. Ultraviolet (UV) rays :	They are used to sterilize the sets of surgical operations rooms.
3. X-rays :	**They are used in :** • photographing bones to detect the sites of bone fractures. • examining mineral raws in industry and showing errors, pores and cracks in these minerals.
4. Gamma rays :	They are used in medical purposes as the treatment and discovering of some swellings.
5.Visible (seen) light :	**It is used in :** • photographic cameras. • television cameras. • light shows.

5 Give reasons for :

1. **The pencil is still in a static state on the desk.**
   Because there is no force acts on it.
2. **The static ball moves when you kick it.**
   Because the object changes its state when a proper force acts on it.
3. **When you push a wall, it doesn't move.**
   Because the force acting on the wall is improper.
4. **The mass of the object remains constant by changing its position on the Earth's surface.**
   Because the mass of the object is the amount of matter that the object contains, and it doesn't change by changing the position.
5. **The weight of the object is always greater than its mass.**
   Because the weight equals the multiplying the mass by Earth's gravitational acceleration.
6. **The weight of the object at the south pole is greater than its weight at the equator.**
   Because the Earth's gravitational acceleration at the south pole is greater than the Earth's gravitational acceleration at the equator.
7. **The weight of a bag of sugar equals 1 kg a phrase is scientifically not accurate.**
   Because the amount of 1 kg represents the mass of a bag of sugar and not its weight.
8. **Object's weight changes from one place to another on the Earth's surface.**
   Because Earth's gravitational acceleration changes from one place to another.

PART 2

9. **Gravitational acceleration changes on Earth's surface from one place to another.**
Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to the non-spherical shape of the Earth.

10. **Electric motor is used in the manufacture of the fans and the washing machines.**
Because it changes the electric energy into mechanical energy.

11. **The wrought iron attracts iron filings after putting it inside an electric coil.**
Because it is changed into a magnet.

12. **The importance of dynamo in case of cutting off the electric current.**
Because it is used in generating of electric energy from mechanical energy.

13. **The importance of nuclear force.**
Because it is used in medicine, industry and producing electricity.

14. **The car passengers are rushed forward when the moving car stops suddenly.**
Due to inertia, as they try to maintain their state of motion.

15. **The car passengers are rushed backward when the car moves suddenly.**
Due to inertia, as they try to maintain their state of rest.

16. **The football player is rushed forward and falls if he is tripped during running forward.**
Due to inertia, as he tries to maintain his state of motion.

17. **Policemen advise drivers to use safety belts in cars and planes.**
Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

18. **The fan is going to turn after the electric current goes off.**
Due to inertia, as its arms try to maintain its state of motion.

19. **Once you use the brakes of a moving bicycle, its speed decreases gradually until it stops.**
Because the friction between the tyre of the bicycle and the brakes generates a friction force against motion of the bicycle which leads to resist it.

20. **Cars that travel on snow have to carry chains that fit around the tyres.**
To increase friction to control the motion.

21. **When you drive a car in a city traffic for sometime, the brakes become hot.**
Because some mechanical energy is transferred into heat energy due to friction.

22. **You are able to run over grass much faster than you run over a ground covered with ice.**
Because friction with grass is more than friction with ice, so the motion is more controlled.

23. **Car tyres are covered with a very coarse substance.**
To increase friction between tyres and the road to help car in starting and stopping motion.

24. • Spare parts of cars are covered with grease.

• Lubricating and oiling mechanical machines.

To decrease friction between moving parts of machines and prevent their erosion.

25. The match is ignited when it is rubbed with a rough surface.

Because friction forces generate heat energy leads to ignition of match.

26. The presence of oil stains on highways is very dangerous.

Because the oil stains decrease the friction forces, so the driver can't control the vehicle.

27. Friction forces are double edged weapon.

Because friction forces have benefits and also they have harms.

28. Blood is pumped all over the body organs.

Due to heart muscle contraction and relaxation.

29. The movement of trees and buildings related to a person in a moving car is considered a relative motion.

Because the trees and buildings appear moving by the same speed of the car, but in the opposite direction.

30. The train motion is considered as transitional motion, while the pendulum's motion is a periodic motion.

Because the train position is changed relative to a fixed point from time to time between initial and final positions, while pendulum's motion is regularly repeated in equal periods of time.

31. Transitional motion differs from periodic motion.

Because transitional motion has initial and final points and it doesn't repeat its motion.

32. We receive the sunlight at the same time we don't hear the sound of solar explosions.

Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.

33. Astronauts can't hear each other voices directly in space.

Because there is no medium for sound waves to travel through.

34. We see lightning before hearing thunder although they occur at the same time.

Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

35. Sound needs a medium to travel through, while light travels through space.

Because sound is from mechanical waves, while light is from electromagnetic waves.

PART 2

36. Sound and water waves are mechanical waves.
Because they are produced due to the vibration of medium particles.

37. Remote sets don't need a medium to control operating the electrical appliances.
Because remote sets work by infrared rays (electromagnetic waves) which can travel through space.

38. Infrared rays are used in cooking.
Because they have heat effect property.

39. X-rays are used in photographing bones.
Because they detect the bone fractures.

40. X-rays are used in examining mineral raws in industry.
To show errors, pores and cracks in these minerals.

41. Gamma rays have medical purposes.
Because they are used to treat and discover some swellings (tumors).

42. Exposing dental treatment tools for ultraviolet rays before reuse.
To be sterilized before reuse.

6 What happens when ... ?

1. You kick a static ball with your foot. (Why)
It will move, because there is a force acting on it.

2. An attacker hits the moving ball with his head. (Why)
It will change its direction, because the force acting on it can change the ball direction.

3. You push a wall with your hand. (Why)
It doesn't move, because the force acting on it is improper.

4. The object's mass increases [relative to the object's weight]. (Why)
The object's weight increases, because object's weight = object's mass × Earth's gravitational acceleration.

5. Migration of a bird from the south pole to the equator [related to : the mass and the weight of the bird]. (Why)
The mass of the bird remains fixed, while the weight of the bird decreases, because the value of Earth's gravitational acceleration at the equator is less than that at the south pole.

6. Approaching from Earth's centre [related to the Earth's gravitational acceleration]. (Why)
The Earth's gravitational acceleration increases, because Earth's gravitational acceleration increases by approaching to the Earth's centre.

7. Moving away from the centre of the Earth [according to : the mass and the weight of an object]. (Why)
The weight of the object decreases, while its mass remains constant, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.

8. **An astronaut moves from the Earth to the Moon [according to : the mass and the weight of the astronaut]. (Why)**
   The mass of the astronaut remains constant, while his weight is changed, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.

9. **An electric current flows through an isolated copper wire which is coiled spirally around a plastic tube containing iron bar and approach it to iron filings (Why).**
   The iron bar will attract the iron filings, because the iron bar is changed into a magnet.

10. **Cutting off an electric current for an electromagnet lifts pieces of iron. (Why)**
    Falling the pieces of iron, because the electromagnet loses its magnetic force.

11. **A moving bus stops suddenly [concerning the driver and the passengers].**
    The driver and passengers will be rushed forward.

12. **A car at rest and suddenly moves forward [concerning the driver and the passengers].**
    The driver and passengers will be rushed backward.

13. **You hit quickly a paper placed over a glass cup and a coin placed over the paper.**
    The coin will fall in the cup.

14. **The passengers don't use the safety belts in cars.**
    The passengers may be injured.

15. **You ride a bike along a flat road, then you use brakes.**
    The bike slows down due to the friction force between the brakes and the tyres of the bike.

16. **Mechanical machines are not lubricated.**
    Parts of machines getting hot and erosion occurs.

17. **Friction between two objects quickly [concerning their temperature].**
    Their temperature will increase.

18. **Contraction and relaxation of body muscles.**
    Movement of all body organs.

19. **Stopping the movement of a heart muscle [concerning the pulse inside the blood vessels].**
    Stopping the pulse.

20. **Two objects move at the same speed and in the same direction.**
    Both of them seem to be at rest to each other.

21. **A car next to your stopping car moves backward suddenly.**
    You will imagine that your car moves forward.

22. **A car next to your stopping car moves forward suddenly.**
    You will imagine that your car moves backward.

PART 2

7 Comparisons :

1 Comparison between mass and weight :

Mass	Weight
1. It is the amount of matter that the body contains.	1. It is the amount of Earth's gravitational to an object.
2. It is a fixed value.	2. It changes from a place to another on the Earth's surface.
3. Its measuring unit is **kilogram**.	3. Its measuring unit is **newton**.
4. Mass = $\frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$	4. Weight = Mass × Earth's gravitational acceleration

2 Comparison between transitional motion and periodic motion :

Transitional motion	Periodic motion
1. It is a motion in which the object's position is changed from time to time relative to a fixed point.	1. It is a motion which is regularly repeated in equal periods of time.
2. It has initial and final positions. ***Examples :*** - A bicycle motion. - A train motion. - A car motion.	2. It doesn't have initial or final positions. ***Examples :*** - A vibrating motion : As the motion of the simple pendulum. - A circular motion : As the movement of the Moon around the Earth. - A wave motion : As the motion of water waves.

3 Comparison between mechanical waves and electromagnetic waves :

Mechanical waves	Electromagnetic waves
1. They are produced by the vibration of medium particles.	1. They are accompanied by electromagnetic forces.
2. They need a medium to transfer through.	2. They spread in all media and free space.
3. Their speed is relatively low. ***Examples :*** • Sound waves. • Water waves.	3. Their speed is exteremely high equals 300 millions m/sec. ***Examples :*** • Light waves. • X-rays. • Radio waves.

8 Activities :

Activity 1 Earth attracts objects :

Steps :

- Put on the ground a set of objects that differ in mass (1 kg - 5 kg - 10 kg).
- Try to lift the masses and put them on a table beginning with the smallest mass then the next one in order.



Observation :

The exerted work to lift objects increases by increasing the object's mass.

Conclusion :

As the object's mass increases, the work done to lift the object upwards increases in the opposite direction of the Earth's gravitational.

Interpretation :

- Earth attracts the objects to its centre by a force called **"Object's weight"**.
- Object's weight increases by increasing the object's mass and vice versa.

Activity 2

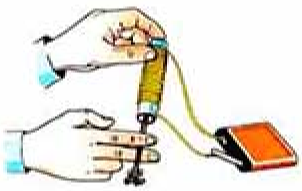
- **To show the magnetic force of electric current.**
- **The idea of how the electromagnet works :**

Procedures :

1. Coil the wire in a spiral shape around a plastic tube (as shown in the figure).
2. Insert the iron bar (or the iron nail) in the tube.
3. Connect the two ends of the wire to the battery.
4. Approach the iron bar (inside the tube) to the iron filings.

Observation :

The iron bar attracts the iron filings (as it is changed into a magnet).



Conclusion :

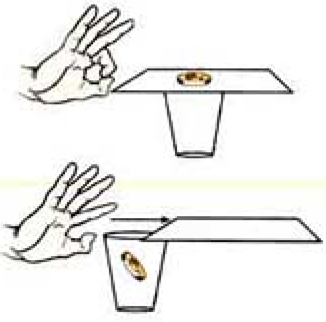
Electric current has a magnetic effect.

PART 2

ACTIVITY 3 To show that objects resist change of rest state :

Procedures :

1. Place a piece of construction paper on the top of a glass cup and put a coin on it.
2. Use your forefinger to deliver a quick hit to the paper.



Observation :

The coin falls inside the cup.

Explanation :

The coin resists the sudden movement of the paper due to inertia, so it remains static, and falls in the cup.

Conclusion :

Force of inertia makes objects resist the change of their rest state.

ACTIVITY 4 To show that objects resist change in the state of motion.

Procedures :

1. Carry some small plastic cubes on your palm and stretch your arm forward.
2. Walk forward fast and suddenly stop at once.



Observation :

The plastic cubes move forward and fall on the ground.

Explanation :

The cubes resist the sudden stopping of the palm of your hand due to inertia, so they continue in the state of motion and fall on the ground.
(The cubes move with the same speed of the person who carries them).

Conclusion :

Force of inertia makes objects resist the change of their motion.

Final Revision on Unit 3

1 Definitions (or scientific terms) :

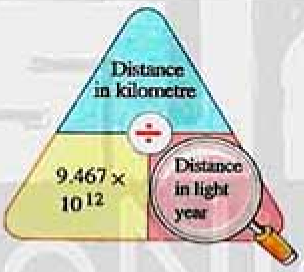
1. Celestial bodies :	They are bodies swim in space such as stars, planets, moons and rocky or gaseous bodies.
2. Stars :	They are big-sized bodies that emit enormous amounts of heat and light.
3. Light year :	It is the distance covered by light in one year and it equals 9.467×10^{12} km.
4. Galaxies :	• They are the greatest units that form the universe. • They are a tremendous collection of stars. • They are a system that consists of thousands of millions of stars.
5. The Sun :	It is the star of our solar system.
6. The planets :	They are eight spherical opaque bodies revolve around the Sun in semi-circular or elliptical (oval) paths.
7. Small (or inner) planets group :	They are the nearest four planets to the Sun in the solar system (Mercury, Venus, Earth and Mars).
8. Big (or outer) planets group :	They are the farthest four planets from the Sun in the solar system (Jupiter, Saturn, Uranus and Neptune).
9. Moons :	They are followers (small space bodies), that are affected by the gravity of the planets that rotate around them.
10. Asteroids :	They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.
11. The belt of the wanderer asteroids :	It is a region that separates the group of the inner planets from the group of the outer planets.
12. Meteors :	They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
13. Meteorites :	They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.
14. Comets :	They are masses of rocks, ice and solidified gases that revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.
15. The atmosphere :	It is an envelope that surrounds the Earth and consists of a group of different gases.
16. Soil :	It is a thin non-compacted layer, which covers the Earth's crust.

PART 2

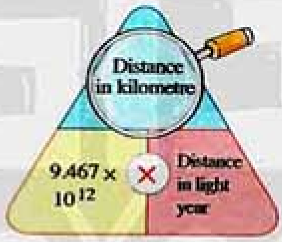
17. Rock :	It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.
18. Magma :	It is a very hot thick (viscous) liquid underneath the Earth's crust.
19. Lava :	• It is the magma when it reaches the Earth's surface. • It is the volcanic flows that spread on the volcanic sides.
20. Igneous rocks :	They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.
21. Sedimentary rocks :	• They are rocks formed from the cohesion of sediments. • They are rocks formed from the fragmentation and sedimentation of old rocks.
22. Metamorphic rocks :	They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.

2 Important law and solved problems :

$$\text{Distance in light year} = \frac{\text{Distance in kilometre}}{9.467 \times 10^{12}}$$



To find the distance in light year



To find the distance in kilometre

Problems :

Problem 1 ***Calculate the distance in light year between two stars. If the distance between them equals 28. 401 $\times 10^{12}$ km.***

Solution

$$\text{Distance in light year} = \frac{\text{Distance in kilometre}}{9.467 \times 10^{12}} = \frac{28.401 \times 10^{12}}{9.467 \times 10^{12}} = 3 \text{ light years.}$$

Problem 2 ***Calculate the distance in kilometre between the Sun and a star, if the distance between them equals 6 light years.***

Solution

$$\text{Distance in kilometre} = \text{Distance in light year} \times 9.467 \times 10^{12}$$
$$= 6 \times 9.467 \times 10^{12} = 56.802 \times 10^{12} \text{ km.}$$

3 Importance or uses :

Item	Importance (or uses)
1. Telescopes :	They are used for identifying the celestial bodies.
2. Oxygen gas :	- It is used in respiration process of living organisms. - It helps in combustion (burning) process of fuels.
3. Nitrogen gas :	- It reduces the effect of oxygen gas during burning processes. - Plants use it to form proteins.
4. Carbon dioxide gas :	It is used by green plants in photosynthesis process to form food for other living organisms.
5. Earth's atmosphere (concerning the meteors and meteorites) :	**The great expansion of atmosphere in the space helps in :** • Burning millions of small falling meteors completely before reaching the Earth's surface. • Reducing the high speed of large meteorites and burning a part of them before they hit the Earth's surface.
6. Ozone layer :	It protects living organisms from the harmful ultraviolet rays.
7. Water :	- Plants use it in photosynthesis process to form food. **- Man and animal benefit from it in :** • Completing food digestion and absorption processes in the digestive system. • Sharing in blood formation. • Stablizing the body temperature.
8. Gravity	**It makes the life possible through :** - Constancy and steadfastness of objects and living organisms on the Earth's surface. - Steadfastness of the hydrosphere position on the Earth's surface. - Keeping the Earth surrounded by the atmosphere.

4 Give reasons for :

1. **• The stars seem as light points although they are huge.**
   • The stars seem as very small light points in spite of their big sizes.
   Because they are far from us.
2. **Astronomers do not measure the distances between stars in kilometres.**
   Because these distances are too huge to be measured by kilometres.
3. **Planets revolve around the Sun in fixed orbits.**
   Due to the attraction force of the Sun to the planets.
4. **Mercury, Venus, Earth and Mars are called the inner planets.**
   Because they are the nearest four planets to the Sun.
5. **The inner planets are called small planets.**
   Because they are small bodies.

PART 2

6. **The density of the inner planets is high.**
   Because they consist of solid bodies.
7. **Jupiter, Saturn, Uranus and Neptune are called the outer planets.**
   Because they are the farthest four planets from the Sun.
8. **The outer planets are called giant planets.**
   Because they are big.
9. **The density of the outer planets is low.**
   Because they consist mainly of gaseous bodies.
10. **The presence of hydrogen gas in a solidified state on the surface of outer planets.**
    Due to the high pressure and extreme coldness on the surfaces of these planets.
11. **The gravity on the Earth's surface is larger than that on Mars' surface.**
    Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.
12. **The object weight is changed from a planet to another.**
    Due to the difference in the gravity acceleration from a planet to another.
13. **Moons are considered the followers of the planets.**
    Because they rotate around the planets and they are affected by their gravity.
14. **Sometimes, we see some luminous lines in the sky at clear nights.**
    Due to the burning of small rocky masses when they penetrate the Earth's atmosphere as a result of heat produced from their friction with air forming meteors.
15. **No one can see Halley's comet more than two times in his life.**
    Because it completes its revolution around the Sun every 76 years.
16. **The tropical radius is larger than the polar radius.**
    Because the Earth is slightly flattened at its poles and indented outward at the equator.
17. **Concerning the volume, the Earth occupies the medium position in the solar system.**
    Because it is the biggest inner planet and it is smaller than any planet from the outer planets.
18. **The presence of a white colour surrounds the Earth.**
    Due to the presence of the atmosphere that appears as a white colour around the Earth.
19. **Some rocky masses that fall from the space don't reach the Earth's surface.**
    Because the expansion of atmosphere in space helps in burning millions of small falling meteors completely before reaching the Earth's surface.
20. **Importance of ozone layer.**
    Because it protects living organisms from the harmful ultraviolet radiations.
21. **Temperature on the Earth's surface suits the life of living organisms.**
    Due to the presence of the Earth in the third position according to its distance from the Sun.
22. **Steadfastness of the hydrosphere on the Earth's surface.**
    Due to the gravitational force of the Earth.
23. **Keeping the Earth surrounded by the atmosphere.**
    Due to the gravitational force of the Earth.

24. The presence of life on the surface of Earth planet only.

Due to :

- The presence of hydrosphere.
- The presence of the atmospheric envelope containing oxygen gas which is needed for life.
- Its temperature is suitable during both day and night.
- Its atmospheric pressure and its gravitational force are suitable.

25. Earth's gravity makes life continue.

The Earth has a force of gravity that makes the life possible through :

- Constancy and steadfastness of objects and living organisms on its surface.
- Steadfastness of the hydrosphere position on its surface.
- Keeping the Earth surrounded by the atmosphere.

26. The Earth consists of many layers, each layer has its own characteristics.

As a result of the revolution of the Earth around its centre, the heavy metals descended towards the centre of the Earth and the light components in density ascended upwards, this led to the formation of a number of Earth's layers.

27. Scientists think that the inner part of the Earth was in a molten form.

Due to the high temperature of Earth's core.

28. • The Earth's inner core is rich in iron and nickel.

• Iron and nickel elements are collected around the centre of the Earth.

Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

29. The plant roots extend easily through the upper part of the Earth's crust but can't extend through its lower part.

Because the upper part is fragmented and loosened layer but the lower part is a solid material that consists of different types of rocks.

30. The crystals of minerals that form the plutonic igneous rock are large-sized.

Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized.

31. The crystals of minerals that form the volcanic igneous rock are small-sized.

Because the minerals that form it don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.

32. Volcanic rocks contain small circular holes.

Due to the extruding of gases from volcanic flows during their cooling and formation of rock.

33. Granite has a coarse texture, while basalt has a smooth texture.

Because the size of crystals of minerals forming granite is large, while the size of crystals of minerals forming basalt is small.

34. The components of granite rock can be seen by the naked eye.

Because it is a plutonic rock which has large crystals.

35. The components of basalt rock cannot be seen by the naked eye.

Because it is a volcanic rock which has very small crystals.

PART 2

36. Limestone consists of mineral calcite.
Due to the precipitation of calcium carbonate in lime solutions.

37. Effervescence takes place when hydrochloric acid is added to a sample of limestone.
Due to evolving of carbon dioxide gas.

38. The cohesion of layers of sedimentary rocks increases by passing time.
Because the sediments exist in the lower layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains.

39. We can differentiate between the sandstone and limestone from colour and texture.
Because sandstone is yellow in colour and its texture is coarse, while limestone is white in colour and its texture is smooth.

40. Some kinds of marble are coloured and others are white.
Because if it contains impurities, it is coloured and if it is pure, its colour is white.

5 What happens when ... ?

1. **You look at the sky in a clear moonless night.**
Stars will be seen as light small points.
2. **We can't invent the telescope.**
We can't discover the celestial bodies.
3. **There is no force of attraction between the Sun and the planets.**
The planets will leave their orbits and float in a random fashion in space and therefore there will not be solar system.
4. **The planet becomes near from the Sun.**
It becomes hotter.
5. **Travelling from Earth planet to Mars planet [related to the attraction force].**
The effect of gravity force decreases.
6. **• Several small asteroids penetrate the Earth's atmosphere.**
• Friction of meteors with Earth's atmosphere.
They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
7. **A large asteroid (meteorite) penetrates the Earth's atmosphere.**
Its outer surface burns only and the remaining part of it without burning falls on the Earth's surface.
8. **The air contains oxygen gas and is free of nitrogen gas.**
The combustion processes will be fast and proceeds without any control.
9. **There is no atmosphere.**
There is no life.
10. **Absence of ozone layer in the atmosphere.**
The ultraviolet rays will reach the Earth's surface and harm living organisms.
11. **The Earth loses its gravity.**
The Earth will not keep its atmosphere and the hydrosphere will not settle in its position, and all objects on Earth's surface will move in a random way, that causes the difficulty in the continuity of life.

12. **The magma comes out of the Earth's surface.**
    It is extruded in the form of volcanic flows and it is called lava.
13. **Decreasing the temperature of lava on the Earth's surface rapidly.**
    Volcanic igneous rocks are formed.
14. **Decreasing the temperature of magma in the depths of Earth's crust slowly.**
    Plutonic igneous rocks are formed.
15. **The minerals that form the plutonic igneous rocks take a long time for crystallization.**
    Their crystals become large-sized.
16. **The minerals that form the volcanic igneous rocks take a short time for crystallization.**
    Their crystals become small-sized.
17. **Extruding of gases from volcanic flows, which form the volcanic rocks.**
    Small circular holes are formed inside the rocks.
18. **You pour a stream of water on a mixture of sand, shingle and gravel put in a rectangular basin.**
    Water takes the smooth sand in its way and the sand deposits at the lower part, while shingle and gravel remain at the upper part.
19. **Increasing the pressure on the grains of rocks forming the layers of sedimentary rocks.**
    The grains become solid and appear as layers above each other, the layers in the bottom are older and the above ones are more recent.
20. **You add hydrochloric acid to limestone.**
    An effervescence takes place due to evolving of carbon dioxide gas.
21. **Sedimentary rocks are subjected to pressure and high temperature.**
    They convert into metamorphic rocks.
22. **Melting of limestone by high temperature, then re-crystallization of the minerals forming it gradually.**
    Marble is formed.
23. **Calcium carbonate precipitates in lime solution.**
    Limestone is formed.

6 Important numbers and ratios :

1. The light year :	**9.467×10^{12} km.**
2. The density of inner planets :	**3.3 to 5.5 gm/cm^3**
3. The density of outer planets :	**0.7 to 1.3 gm/cm^3**
4. The acceleration due to gravity on the surface of Mercury planet :	**3.78 m/sec^2**
5. The acceleration due to gravity on the surface of Venus planet :	**8.60 m/sec^2**
6. The acceleration due to gravity on the surface of Earth planet :	**9.78 m/sec^2**
7. The acceleration due to gravity on the surface of Mars planet :	**3.72 m/sec^2**
8. The acceleration due to gravity on the surface of Jupiter planet :	**22.88 m/sec^2**

9. The acceleration due to gravity on the surface of Saturn planet :	9.05 m/sec^2
10. The acceleration due to gravity on the surface of Uranus planet :	7.77 m/sec^2
11. The acceleration due to gravity on the surface of Neptune planet :	11.00 m/sec^2
12. No. of moons rotating around Earth planet :	1
13. No. of moons rotating around Mars planet :	2
14. No. of moons rotating around Jupiter planet :	62
15. No. of moons rotating around Saturn planet :	60
16. No. of moons rotating around Uranus planet :	27
17. No. of moons rotating around Neptune planet :	12
18. The periodic time for Halley's comet around the Sun :	76 years
19. The difference between the tropical radius and the polar radius :	22 km.
20. The periodic time for rotation the Earth around the Sun :	365.25 days
21. The distance between the Sun and the Earth :	150 million kilometres
22. The average radius of the Earth :	6386 km approximately.
23. The mass of the Earth :	5.9×10^{24} kg.
24. The ratio of oxygen gas in the atmospheric air :	21%
25. The ratio of nitrogen gas in the atmospheric air :	78%
26. The ratio of carbon dioxide gas in the atmospheric air :	0.03%
27. The ratio of water bodies concerning the area of Earth's surface :	71%
28. The ratio of land concerning the area of Earth's surface :	29%
29. The ratio of salty water concerning the area of water bodies :	97%
30. The ratio of fresh water concerning the area of water bodies :	3%
31. The normal atmospheric pressure :	76 cm.Hg.
32. The thickness of the Earth's crust :	8 – 60 km approximately.
33. The thickness of the mantle :	2885 km approximately.
34. The thickness of the outer core :	2100 km approximately.
35. The thickness of the inner core :	1350 km approximately.
36. The ratio of sedimentary rocks concerning the total volume of the Earth's crust rocks :	5%

7 Comparisons :

1 Comparison between stars, planets and moons :

Stars	Planets	Moons
They are big-sized bodies emit enormous amounts of heat and light.	They are spherical opaque bodies revolve around the Sun in elliptical orbits.	They are followers (small space bodies) that are affected by the gravity of the planets that rotate around them.

2 Comparison between meteors and comets :

Meteors	Comets
1. They are celestial bodies burn up completely when they penetrate the atmosphere of the Earth as a result of the heat produced from their friction with air forming luminous arrows in the sky.	1. They are celestial bodies revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.
2. They consist of small rocky masses.	2. They consist of masses of rocks, ice and solidified gases.

3 Comparison between asteroids and planets :

Asteroids	Planets
1. They are rocky space bodies , most of them rotate in the region of the belt of wanderer asteroids.	1. They are eight spherical opaque bodies revolve around the Sun in elliptical (oval) orbits.
2. They consist of thousands of different sized rocky masses.	2. They consist of rocks or solidified gases.

4 Comparison between the inner planets and the outer planets :

Points of comparison	The inner planets	The outer planets
1. Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Their arrangement from the Sun :	Mercury - Venus - Earth and Mars.	Jupiter - Saturn - Uranus and Neptune.
3. Size :	Small in size.	Big in size.
4. Structure :	Rocky bodies.	Gaseous bodies.
5. Density :	High	Low
6. Atmosphere :	All of them have an atmosphere except Mercury.	All of them have an atmosphere.
7. No. of moons rotating around them :	A few number of moons (except Mercury and Venus have no moons).	Large number of moons.

PART 2

5 Comparison between oxygen, nitrogen and carbon dioxide gases :

Points of comparison	Oxygen gas	Nitrogen gas	Carbon dioxide gas
1. Their percentage in air :	21%	78%	0.03%
2. Importance :	- It is used in respiration process of living organisms. - It helps in combustion (burning) process of fuels.	- It reduces the effect of oxygen gas during burning processes. - Plants use it to form proteins.	It is used by green plants in photosynthesis process to form food for other living organisms.

6 Comparison between salty water and fresh water :

Salty water	Fresh water
1. It represents 97% of the water area on the Earth's surface.	1. It represents 3% of the water area on the Earth's surface.
2. It exists in : • Oceans. • Seas.	2. It exists in : • Rivers. • Lakes. • Snow at the two poles. • Ground water.

7 Comparison between Earth's layers :

Points of comparison	Earth's crust	The mantle	The core	
			Outer core	Inner core
1. Order :	The first layer	The second layer	The third layer	
2. Formation :	It is a relatively light outer layer.	It is a rocky layer.	It is a layer of molten metals.	It is a solid layer rich in iron and nickel.
3. Thickness :	Ranges between 8 - 60 km approximately.	About 2885 km approximately.	About 2100 km approximately.	Its radius is about 1350 km approximately.

8 Comparison between plutonic and volcanic igneous rocks :

Points of comparison	Plutonic igneous rocks	Volcanic igneous rocks
1. Size of the crystals :	Large	Small
2. Texture :	Coarse	Smooth
3. Holes :	Absent	Present

9 Comparison between magma and lava :

Points of comparison	Magma	Lava
1. Definition :	It is a very hot thick (viscous) liquid underneath the Earth's crust.	It is the magma when it reaches the Earth's surface.
2. The resulting rocks :	Plutonic igneous rocks.	Volcanic igneous rocks.
3. Place of formation :	Gaps and cracks of the Earth's crust.	The Earth's surface.

10 Comparison between granite and basalt rocks :

Points of comparison	Granite rock	Basalt rock
1. Kind :	Plutonic igneous rock.	Volcanic igneous rock.
2. Colour :	Pink or grey.	Dark in colour.
3. Components :	Can be seen by naked eye.	Cannot be seen by naked eye.
4. Found in :	The Eastern Desert and Sinai Peninsula.	Egypt in Abo-Zaabal, near Abou-Rawash and El-Fayoum.
5. Minerals forming it :	Quartz, feldspar and mica.	Olivine, feldspar and pyroxene.

11 Comparison between sandstone and limestone :

Points of comparison	Sandstone	Limestone
1. Colour :	Yellow	White
2. Texture :	Coarse	Smooth
3. Minerals forming it :	Quartz	Mineral calcite (calcium carbonate).
4. Reaction with dilute hydrochloric acid :	No reaction takes place.	A chemical reaction takes place with an effervescence due to evolving of carbon dioxide gas.

12 Comparison between types of rocks :

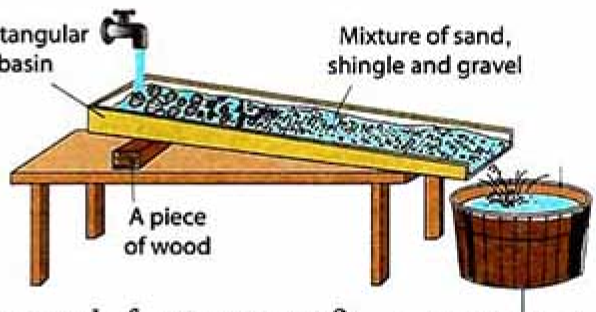
Points of comparison	Igneous rocks	Sedimentary rocks	Metamorphic rocks
1. Formation :	They are formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.	They are formed from the cohesion of sediments.	They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.
2. Examples :	Granite and basalt.	Sandstone and limestone.	Marble.

8 Activity :

ACTIVITY To show transportation and deposition processes.

Steps :

- Bring a rectangular basin and place it in an inclined position.
- Put a mixture of sand, shingle and gravel at its upper part.
- Pour water upon this mixture.
- **What do you notice** when increasing the speed of water current ?



PART 2

Observation :

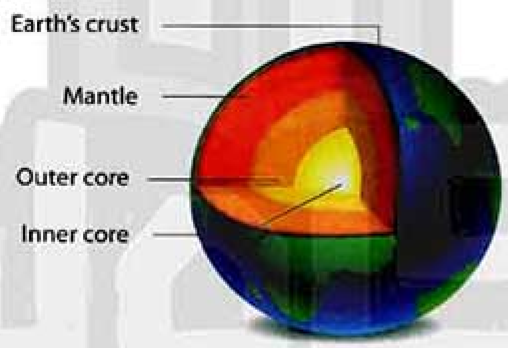
1. Water takes the smooth sand on its way and the sand deposits in the collecting vessel, while shingle and gravel remain in the rectangular basin.
2. If the speed of water increases, the size of the transported grains increases.

Similarly :

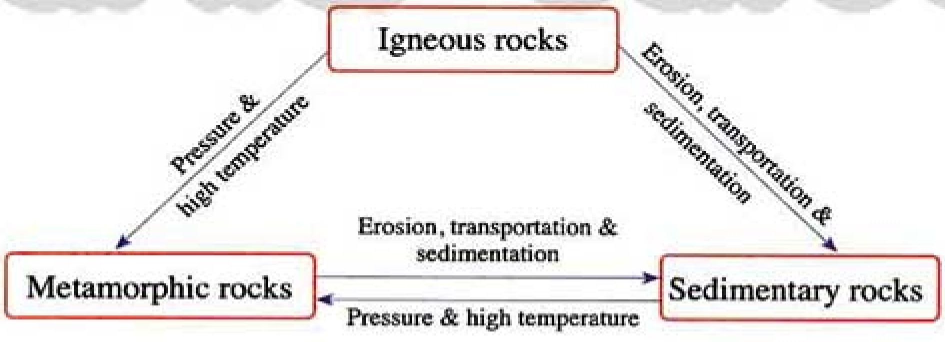
The water currents in seas and rivers transport the fragmented particles of rocks and deposit them above each other in the form of layers.

9 Important figures :

1. Earth's layers :



2. The changes of rocks :



PART 3

Final Examinations



Final Examinations of some Governorates.

Important note :

There is an additional question at the end of the school's examinations on the parts which are canceled from the syllabus of the previous year.

PART 3

1 Cairo Governorate — St. Fatima Language School

Answer the following questions :

Question 1

A Complete the following statements :

1. .... and .... are examples of monovalent atomic groups.
2. .... and .... are from the benefits of friction.
3. (H_2SO_4) is .... , while (NaOH) is ....
4. An atom of .... doesn't lose or gain any electrons under ordinary conditions.
5. Carbon monoxide is a dangerous gas which causes .... and ....
6. Granite is from .... rocks.

B Compare between :

1. Positive ion and negative ion.
2. Plutonic and volcanic rocks.

Question 2

A Choose the correct answer :

1. Regarding the volume, the Earth occupies the .... order in the solar system.
   a. third b. fourth c. fifth d. eighth
2. All of nonmetals don't conduct electricity except ....
   a. bromine. b. aluminium. c. graphite. d. mercury.
3. When an atom loses, gains or shares by one electron, its valency is ....
   a. monovalent. b. divalent. c. trivalent. d. tetravalent.
4. Water bodies on the Earth's surface form the percentage of ....
   a. 50 % b. 71 % c. 40 % d. 30 %
5. .... oxides are resulted during the time of lightning.
   a. Carbon b. Sulphur c. Nitrogen d. (a) and (b)
6. The bar used in electromagnet is made up of ....
   a. isolated copper. b. soft iron. c. silver. d. aluminium.
7. From the examples of forces inside living systems : ....
   a. pulse inside blood vessels. b. inertia.
   c. brakes. d. all of the previous answers.

B Knowing that the mass of carbon (C) is 12 and oxygen (O) is 16, find the total mass of reactants and products through the following reaction : $C + O_2 \longrightarrow CO_2$

C Define : 1. Relative motion. 2. Chemical equation.

Question 3

A Correct the underlined words :

1. The chemical formula of carbonate group is **$(HCO_3)^-$**.
2. **Sandstone** is an example of metamorphic rocks.
3. **Hydrogen** gas is used by plants to form proteins.
4. Simple pendulum motion is a **transitional motion**.
5. Strong nuclear forces are used in **getting radioactive elements used in medicine**.
6. Water molecule consists of **four** atoms for two elements.

B Give reasons for :

1. Both sodium ion and oxygen ion have the same number of electrons (Na = 11, O = 8).
2. Acids have different effect on litmus paper than that of bases.
3. Astronauts can't hear each other voices directly in space.

C Calculate the mass of an object if its weight is 980 newton and the Earth's gravitational acceleration is 9.8 m/sec^2.

Question 4

A Write the electronic configuration of each of the following atoms :

1. $_1H$ 2. $_{11}Na$ 3. $_{17}Cl$ 4. $_{10}Ne$

Then indicate :

1. The type of each element (metal – nonmetal – noble gas).
2. How the bond is formed between :
   a. Two hydrogen atoms. b. Sodium and chlorine atoms.

B Write the scientific term :

1. A molten material exists at depths beneath the crust.
2. Oxides that cause building corrosion.
3. The only metal exists in a liquid state.
4. Oxides produced due to the combination of oxygen with a nonmetal.

PART 3

5. Waves which don't need a medium to travel through.
6. The sum of reactants masses in any chemical reaction equals the sum of products masses.

C What happens when ... ?

1. The passengers don't use the safety belts in car.
2. Burning of coal and cellulose fibres.

Additional questions

A Complete the following statements :

1. The nearest planet to the Sun is .... , while the farthest planet from the Sun is ....
2. The comets consist of two parts, which are .... and ....

B Write the scientific term :

1. A system that consists of thousands of millions of stars.
2. It is the distance covered by light in one year.

2 Cairo Governorate — The Good Shepherd Sisters' School

Answer the following questions :

Question 1

A Correct the underlined words :

1. The symbol of carbonate atomic group is (**NH_4**).
2. The more we approach to the Earth's centre, the value of the Earth's gravitational acceleration **decreases**.
3. Electric circuit has a **kinetic** effect.
4. The symbol of lead is (**Ld**).
5. The Earth is located in the **fifth** arrangement from the Sun.
6. Basalt is an example of **sedimentary** rocks.

B Write the suitable scientific term :

1. Elements having 1, 2 or 3 electrons in their outermost energy level.
2. Materials dissolve in water producing $(OH)^-$.
3. Breaking bonds in reactants atoms and forming new bonds in products.

4. The change in an object's position as time passes relative to another object.
5. A gas represents 21% of the Earth atmosphere.
6. Natural solid material, that exists in the Earth's crust.

Question 2

A Complete the following sentences :

1. Symbol of zinc is .... and its valency is ....
2. $2CO + O_2 \xrightarrow{\Delta}$ ....
3. Burning of .... causes lung cancer, while .... resulting from lightning affect the nervous system.
4. Electric motor converts .... energy into .... energy.
5. Friction causes .... of machines parts.
6. Cooking food is an application of .... rays while discovering tumors is an application of .... rays.
7. The Earth layers from the surface to the centre are : the crust, ... and ....

B What happens ... ?

1. To the passengers if a vehicle starts working in front direction after rest.
2. To the force of inertia when we use safety belts in a car.

Question 3

A Write the molecular formula of each of the following :

1. Sodium hydroxide. 2. Calcium oxide. 3. Copper carbonate.

B Write the following chemical equations :

1. Carbon burning in the presence of oxygen.
2. Hydrochloric acid combined with ammonia gas.

C Problem : Calculate the mass of an object of weight 490 newton, if the Earth's gravitational acceleration is 9.8 m/sec^2.

Question 4

A Choose the correct answer :

1. The type of bond in oxygen molecule is .... bond.
   a. ionic b. single covalent c. double covalent

2. (Na_2O) is an example of ....

a. oxide. b. salt. c. acid.

3. .... nuclear forces are used in medicine and scientific researches.

a. Weak b. Strong c. (a) and (b)

4. .... is a force found in the living systems.

a. Inertia b. Brake c. Pulse in blood vessels

5. The pendulum is an example of .... motion.

a. vibrating b. wave c. circular

6. Limestone is a type of .... rocks.

a. sedimentary b. igneous c. metamorphic

B Give reasons for :

1. Acids change the colour of litmus paper into red.
2. Importance of electromagnet.
3. We see lightning before hearing thunder.
4. Effervescence takes place when ($HC\ell$) is added to limestone.

C Write the electronic configuration of :

($^{20}_{10}Ne$) and mention its type.

Additional questions

A Choose the correct answer :

1. The inner planets having moons rotating around them except ....

a. Mercury and Mars. b. Venus and Mars.
c. Mercury and Venus. d. (a) and (b).

2. The celestial bodies that consist of head and tail are ....

a. meteors. b. asteroids. c. comets. d. meteorites.

B Give a reason for :

The density of the outer planets is low.

3 Cairo Governorate — Sunrise Language School

Answer the following questions :

Question 1

A Complete the following sentences :

1. The bond in sodium chloride molecule is .... bond whereas the bond in water molecule is .... bond.
2. The weight of an object is measured in .... unit.
3. Granite consists of .... , ... and .... minerals.
4. The chemical formula of sulphuric acid is ....
5. Limestone is from .... rocks, but granite is from .... rocks.
6. The .... layer in the atmospheric air protects living organisms from the harmful rays.

B Correct the underlined words :

1. Inner core of the Earth is rich in iron and **aluminium**.
2. **Salts** are substances that dissociate in water producing negative hydroxide ions $(OH)^-$.

C Name two benefits of friction forces.

Question 2

A Choose the correct answer :

1. The car brake performance is an application of ....
   a. attraction force. b. centrifugal force. c. friction force. d. force of inertia.
2. The layer which consists of molten metals is the ....
   a. crust. b. outer core. c. mantle. d. inner core.
3. All the following are metals except ....
   a. iron. b. copper. c. oxygen. d. sodium.
4. Electromagnet is used in making ....
   a. calculator. b. microscope. c. electric bell. d. night vision apparatus.
5. The chemical formula of sodium hydroxide is ....
   a. Na_2CO_3 b. $NaCl$ c. $NaOH$ d. HCl

PART 3

6. The Earth is located in the solar system regarding its distance from the Sun in the .... position.

a. fifth b. third c. fourth d. seventh

B Mention one difference between :

1. Electric motor and electric generator.
2. The crust and mantle.
3. Metals and nonmetals.

C Give one example for :

1. Mechanical waves.
2. Igneous volcanic rock.

Question 3

A Write the scientific term for each of the following sentences :

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
2. A rock formed of lava flows when it comes on the Earth's surface.
3. It's an atom that gains one electron or more.
4. The motion which is regularly repeated in equal periods of time.
5. The Earth attraction force to an object.

B Give reasons for :

1. Effervescence takes place when hydrochloric acid is added to a sample of limestone.
2. The car passengers are rushed forward when the car stops suddenly.

C Which of the following rocks is sedimentary, igneous or metamorphic ?

1. Marble. 2. Sandstone.

Question 4

A Put true in front of the right statement and false in front of the wrong one :

1. When ammonia gas reacts with hydrochloric acid, white clouds are formed. ( )
2. The water bodies represent about 50 % of the Earth's surface. ( )
3. Air pressure on the Earth's surface is suitable for the continuity of life. ( )
4. Sodium hydroxide changes the colour of litmus paper into red. ( )
5. Green plants use carbon dioxide gas in photosynthesis process. ( )
6. The idea of machine lubrication depends on the decreasing of the friction force. ( )

B Mention one application / importance for each of the following :

1. Ultraviolet rays. 2. Infrared rays. 3. Oxygen gas.

C Problem :

Calculate the mass of an object weights 98 newton (knowing the Earth's gravity = 9.8 m/sec^2).

Additional questions

A Correct the underlined words :

1. The inner planets are <u>equal in size to</u> the outer planets.
2. The most famous comet for the inhabitants of the Earth is <u>Pluto</u>.

B What happens when ... ?

1. Meteors enter the atmosphere.
2. We can't invent the telescope.

4 Cairo Governorate — Pioneer Integrated School

Answer the following questions :

Question 1

A Complete the following :

1. The symbol of oxygen ion is .... while that of sodium ion is ....
2. Burning of coal and cellulose fibres causes .... pollution and ....
3. Nonmetals are bad conductors of electricity except ....
4. .... is from pneumatic instruments.
5. Electric generator is used to change the .... energy into .... energy.
6. .... gas is used in combustion process.
7. .... is an example of igneous volcanic rocks.
8. .... is used in Egypt to generate electricity.

B Compare between each of the following :

1. Positive ion – negative ion (according to definition – example).
2. Basalt – granite (according to minerals forming it).

PART 3

Question 2

A Choose the correct answer :

1. (SO_4) is an example for .... atomic group.
   a. trivalent b. monovalent c. divalent d. no correct answer
2. All of the following are covalent molecules except ....
   a. H_2O b. MgO c. HCl d. O_2
3. The apple falls down between an object and the Earth is equal to the ....
   a. electromagnet force. b. Earth's gravitational force.
   c. weak nuclear force. d. strong nuclear force.
4. The Earth's inner core contains .... in solid state.
   a. iron & copper b. nickel & copper
   c. iron & nickel d. copper & aluminium
5. In the periodic motion, the ....
   a. pathway is straight. b. motion is regularly repeated.
   c. time is regularly repeated. d. speed is regularly changed.
6. The unit of measuring the weight is ....
   a. m/sec. b. joule. c. newton. d. kg.
7. .... are used in night vision apparatus.
   a. Infrared rays b. Ultraviolet rays c. Gamma rays d. X-rays
8. Igneous plutonic rocks are formed of molten material underneath the Earth's crust which is called ....
   a. magma. b. lava. c. core. d. mantle.

B What is meant by each of the following ... ?

1. Chemical reaction.
2. The law of conservation of matter.

Question 3

A Write the scientific term :

1. The effect that attempts to change the object's phase from being static to motion.
2. The gas that acts as a greenhouse.
3. Compounds produced as a result of the combination of a positive metal ion with a negative atomic group except oxygen.
4. It is the motion of an object in which its position is changed relative to a fixed point from initial to final positions.

B Calculate the mass of an object, its weight is 100 newton in a place on the Earth. (knowing that the Earth's gravity in this place = 10 m/sec^2).

C Put (✓) or (✗) and correct the wrong statements :

1. Marble is an example of igneous rocks. ( )
2. Weight of the body doesn't change from place to another on the Earth's surface. ( )
3. Sodium chloride is considered as a base. ( )
4. We see lightning before hearing thunder. ( )

Question 4

A Give reasons for each of the following :

1. A white powder is formed when a magnesium ribbon is burned in the air.
2. The presence of a white colour surrounds the Earth planet.
3. Volcanic rocks contain small circular holes.
4. Object's weight changes from one place to another on the Earth's surface.
5. The car passengers are rushed forward when the moving car stops suddenly.

B What happens when ... ?

1. You add hydrochloric acid to limestone.
2. A glass rod wet with ammonia solution is exposed to a test tube containing concentrated hydrochloric acid.

C Write the chemical formula of the following compounds :

1. Sodium bicarbonate	....
2. Aluminium sulphate	....

Additional questions

A Complete the following statements :

1. The reflecting telescopes are used for ....
2. The two factors affecting the force of gravity between two celestial bodies are .... and ....

B Compare between :

Inner planets and outer planets.

PART 3

5 Cairo Governorate — El Shaheed Ibraheem El-Refaey Language School

Answer the following questions :

Question 1

A Complete the following :

1. Elements can be classified according to their properties and electronic structure into ...., ... and noble gases.
2. The bond in magnesium oxide molecule is ...., but the bond in molecule of water is ....
3. $2Mg + O_2 \xrightarrow{\Delta}$ ....
4. Waves are divided into two types which are .... waves and electromagnetic waves.
5. The Earth consists of number of arranged layers from the surface to the centre : the crust, ... and ....

B Give reasons for :

1. Ionic bonds produce compounds only not elements, but the covalent bonds produce both types, an element or even a compound.
2. Temperature on the Earth's surface suits the life of living organisms.
3. Policemen advise drivers using safety belts in cars and planes.
4. Effervescence takes place when hydrochloric acid is added to a sample of limestone.

Question 2

A Write the scientific term that indicated by each of the following statements :

1. A bond resulting from the participation of each of the two atoms with 3 electrons.
2. A movement repeated regularly at equal intervals of time.
3. A natural solid material that exists in the crust and consists of one mineral or a group of minerals.
4. An atom that lost an electron or more during the chemical reactions.
5. The property of object resistance to change its state from the rest of movement unless a force affects on it.
6. It is a thin non-compacted layer which covers the Earth's crust.
7. The amount of Earth's attraction to the object.

B Knowing that the mass of carbon (C) = 12 and oxygen (O) = 16, find the total masses of reactants and products through the following reaction :

$C + O_2 \xrightarrow{\Delta} CO_2$

C Give one example for each of the following :

1. Mechanical waves.
2. The igneous volcanic rocks.
3. Electromagnetic waves.
4. Salt dissolve in water.

Question 3

A Write down the electronic configuration of the atoms of the following elements :

1. $_{12}Mg$
2. $_{18}Ar$

Then indicate :

1. The type of each atom (metal – nonmetal – noble gas).
2. The type of each ion (positive – negative - has no ions).

B Choose the correct answer :

1. The Earth is located in the solar system regarding its distance from the Sun in the .... order.
   a. fifth b. fourth c. third d. seventh
2. If the weight of a body is 400 newton, knowing that gravitational acceleration of the Earth is 10 m/sec^2, its mass = ...
   a. 40 kg. b. 4 kg. c. 4000 kg. d. 80 kg.
3. Electromagnet is used in making the ....
   a. calculator. b. electric bell. c. microscope. d. night vision system.
4. The fresh water represents .... of the total water on the Earth's surface.
   a. 97 % b. 71 % c. 29 % d. 3 %
5. The car brake performance is an application of ....
   a. attraction forces. b. friction forces. c. centrifugal forces. d. forces of inertia.
6. The main minerals that share in the structure of granite are ....
   a. quartz, feldspar & mica. b. calcite.
   c. olivine & pyroxene. d. (b) and (c).

C Write one technological application for each of the following :

1. Infrared rays.
2. Ultraviolet rays.
3. X-rays.
4. Visible (seen) light.

PART 3

Question 4

A Write the chemical formula for the following molecules :

1. Magnesium oxide. 2. Sodium sulphate. 3. Hydrochloric acid.

B The following formulae represent some molecules, name each one :

1. $NaNO_3$ 2. $Ca(OH)_2$ 3. CO_2

C Compare between :

1. Acids and bases giving examples for each.
2. Electric generator and electric motor.

D Correct the underlined words :

1. The water of ocean is **fresh** water.
2. Electric generator (dynamo) converts the **heat energy** into electric one.
3. Inner core of the Earth is rich in iron and **aluminium**.
4. **Basalt** is a sedimentary rock.

Additional questions

A Choose the correct answer :

1. The Sun is a ....
   a. meteor. b. planet. c. star.
2. Which of the following planets has the largest gravity on its surface ? ....
   a. Mercury. b. Earth. c. Venus.

B Give a reason for :

1. Planets revolve around the Sun in fixed orbits.
2. Astronomers do not measure the distances between stars by kilometres.

6 Giza Governorate — Al Farouk Language School

Answer the following questions :

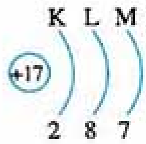
Question 1

A Write the scientific term :

1. Breaking of bonds between the molecules of reactants and formation new bonds between the molecules of products.
2. A bond is produced due to electric attraction between a positive ion and a negative ion.

3. The attraction of the Earth to object.
4. It is the change in object's position by passing time relative to a fixed point.
5. A wave that needs medium to pass through.

B From the electronic configuration for the following element, complete :



1. The type of element : ....
2. The valency of element : ....
3. The ion of the element : ....
4. The type of chemical bond when it combines with sodium ($_{11}Na$) : ....

Question 2

A Give reasons for :

1. An effervescence takes place when hydrochloric acid is added to a piece of limestone.
2. Infrared rays are used in cooking food.
3. By burning a magnesium ribbon, white powder is formed.
4. We see lightning before hearing thunder although they occur at the same time.

B What happens in the following cases ... ?

1. The absence of carbon dioxide gas.
2. If an electric current passes in an isolated electric wire and coiled around wrought iron bar.
3. Approaching a glass wet of ammonia solution from tube has concentrated hydrochloric acid.

Question 3

A Write the name of each compound from the following and mention its type (acid – oxide – base – salt) :

1. CaO 2. Na_2SO_4 3. KOH 4. HNO_3

B Calculate the weight of a body its mass is 50 kg, knowing that acceleration due to gravity is 10 m/sec^2.

C Calculate the total masses of reactants and products of the following reaction :

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$

Knowing that the mass number of elements as Mg = 24 , O = 16

Question 4

A Mention the name of environmental pollutants that causes :

1. The harms of nervous system and eye. 2. Lung cancer.

PART 3

B Correct the underlined words :

1. **Dynamo** is used in making an electric bell.
2. **Metamorphic** rocks are formed by the formation of sediments.
3. **Salts** are decomposed in water producing negative hydroxide ions.

C Complete the following sentences :

1. Limestone is from .... rocks, while .... is from metamorphic rocks.
2. Dynamo changes .... energy into .... energy.
3. The valency of phosphate group is .... , while the valency of carbonate group is ....

Additional questions

A Complete the following statements :

1. The types of telescopes are .... and ....
2. The greatest unit that forms the universe is called ....

B What happens when ... ?

1. A meteorite enters the atmosphere.
2. Travelling from Earth planet to Mars planet (related to the attraction force).

7 Giza Governorate — Talaee Islamic Language School

Answer the following questions :

Question 1

A Write the scientific term :

1. A set of atoms joined together, behave like one atom only, having a special valency and cannot be existed individually.
2. A molten material exists at depths beneath the crust.
3. The motion in which the object's position is changed relative to a fixed point from time to time.
4. Substances are dissociated in water producing negative hydroxide ions $(OH)^-$.
5. An effect that attempts to change the object state from being static to motion or vice versa.
6. Atmospheric layer that protects the living organisms from harmful ultraviolet radiation.

B Give reasons for the following :

1. The car passengers are rushed forward when the car stops suddenly.

2. A chemical equation should be balanced.
3. Steadfastness of the hydrosphere on the Earth's surface.
4. The bond in an oxygen molecule is a double covalent bond.

C Mention one use of :

1. X-rays. 2. Electromagnet.

Question 2

A Complete the following statements :

1. The chemical formula ($NaNO_3$) represents .... molecule, while (H_2SO_4) formula represents .... molecule.
2. Green plants use .... gas in photosynthesis process, and use .... gas to form proteins.
3. .... bonds produce compound molecules only, while .... bonds produce elements and compounds molecules.
4. Granite consists of ...., ... and .... minerals.

B Compare between metals and nonmetals.

C Calculate the weight of a 0.8 kg mass ball, knowing that the Earth's gravitational acceleration is 9.8 m/sec^2.

Question 3

A Choose the correct answer :

1. Regarding to the volume, Earth occupies the .... order in the solar system.
   a. fifth b. fourth c. third d. seventh
2. All of the following are electromagnetic waves except the ....
   a. sound waves. b. ultraviolet waves. c. infrared waves. d. visible light.
3. During chemical reactions, potassium ($_{19}K$) atom loses electron(s) and changes into ....
   a. K^+ b. K^- c. K^{-2} d. K^{+2}
4. Car brakes are one of the applications of ....
   a. gravitational force. b. friction force. c. nuclear force. d. force of inertia.
5. All of the following turn blue litmus paper into red except ....
   a. HCl b. HNO_3 c. NaOH d. H_2SO_4

B Write the electronic configuration for the following elements :

1. $^{14}_{7}N$ 2. $^{24}_{12}Mg$

PART 3

Then mention :

1. The type of each element.
2. The type of formed ion for each element.

C What do we mean by ... ?

1. Periodic motion.
2. Inert element.

Question 4

A Correct the underlined words :

1. The bond in nitrogen molecule is **single covalent** bond.
2. **Mass** is an attraction amount of Earth to the body.
3. Dynamo converts the **heat energy** into electric one.
4. Lithium ($_3Li$) is **divalent**.
5. **Bromine** is the only liquid metal.

B Write the chemical formula for the following compounds :

1. Hydrogen chloride.
2. Aluminium carbonate.

C Mention the differences between the sandstone rock and the limestone rock.

Additional questions

A Write the scientific term :

1. Opaque bodies that revolve around the Sun in one direction.
2. An instrument that is used in identifying the celestial bodies.

B Put (✓) or (✗) and correct the worng one :

1. The galaxy that our solar system belongs to is "The Milky Way galaxy". ( )
2. Jupiter is from inner planets. ( )

8 Giza Governorate — Abo El-Nomrous Educational Directorate

Answer the following questions :

Question 1

A Complete the following :

1. The force of gravity between two objects depends on .... and ....
2. The motion of simple pendulum is .... motion, while the motion of the train is .... motion.

3. Granite belongs to .... rocks, while marble belongs to .... rocks.

4. The electric motor changes .... energy into .... energy.

B Give reasons for :

1. Lubricating and oiling of mechanical machines.
2. The chemical equation must be balanced.
3. We see lightning before hearing thunder.

Question 2

A Choose the correct answer :

1. Electromagnet is used in making ....
   a. microscope. b. night vision systems. c. electric bell.
2. The measuring unit of weight is ....
   a. newton. b. kilogram. c. kilometre.
3. From the applications on ultraviolet rays is ....
   a. photographing bones. b. sterilizing surgical operation rooms. c. night vision systems.
4. .... oxides are resulted during time of lightning.
   a. Carbon b. Sulphur c. Nitrogen
5. The outer layer of the Earth is the ....
   a. crust. b. mantle. c. core.
6. The volcanic flows is known as ....
   a. magma. b. lava. c. mantle.
7. Car brake is one of the application of .... forces.
   a. friction b. nuclear c. inertia
8. Inner core of the Earth is rich in ....
   a. iron and copper. b. iron and nickel. c. iron and silver.

B Mention one use of :

1. Friction. 2. Electromagnet.
3. Electric generator. 4. Safety belts in cars.

C If the Earth's gravitational acceleration in a place is 10 m/sec^2, find the weight of an object if its mass is 60 kg.

PART 3

Question 3

A Put (✓) or (✗) and correct the wrong ones :

1. Strong nuclear force is used in scientific researches. ( )
2. Basalt consists of quartz, feldspar and mica minerals. ( )
3. When ammonia gas reacts with hydrochloric acid, white powder is formed. ( )
4. Fresh water represents 3% of total volume of water on the Earth. ( )
5. Force is an amount of attraction of Earth to the body. ( )
6. Chemical formula of carbonate group is $(CO_3)^-$. ( )
7. Water consists of four atoms for two elements. ( )
8. The valency of noble gases is zero. ( )

B If you have an element : $^{39}_{19}X$

1. Mention its kind, why ?
2. Mention its valency (give a reason).
3. Write the chemical formula of its oxide.
4. It combines with sulphate to give .... salt.

Question 4

A Compare between :

1. Acids and bases.
2. Metal oxides and nonmetal oxides.
3. Carbonate group and bicarbonate group.

B What is meant by ... ?

1. Positive ion.
2. Valency.
3. Weight.

C What happens in each of the following ... ?

1. If we burn a magnesium strip in air.
2. A chlorine atom combines with hydrogen atom.

D Write the chemical equation for :

1. Magnesium with oxygen.
2. Carbon monoxide with oxygen.
3. Ammonia with concentrated hydrochloric acid.

Additional questions

A Complete the following statements :

1. The nearest planet to the Sun is .... , While the farthest planet from the Sun is ....
2. The number of moons revolving around Jupiter is ...., while that revolves around Mars is ....

B Calculate the distance in kilometre between the Sun and a star if the distance between them is 3 light years.

9 Giza Governorate — Delta Language Schools

Answer the following questions :

Question 1

A Complete the following :

1. Some nonmetals have more than one valency such as .... and ....
2. Oil and lubricant are used in machines to ....
3. The total mass of reactants equal the total mass of ....
4. Electromagnet changes .... energy into .... energy.
5. The Earth's inner core has .... and ....
6. .... and .... are examples of sedimentary rocks.

B Write one function for each :

1. X-rays.
2. Strong nuclear force.
3. Ultraviolet rays.

C Find the mass of products and reactants (C = 12 , O = 16) : $C + O_2 \xrightarrow{\Delta} CO_2$

Question 2

A Put (✓) or (✗) and correct wrong one :

1. Acids change litmus paper into blue. ( )
2. Sulphur oxides and nitrogen oxides are acidic gases. ( )
3. Dynamo changes heat energy into electric energy. ( )
4. Ozone layer protects us from harmful infrared rays. ( )
5. Granite is a metamorphic rock. ( )
6. The force is measured in newton. ( )

PART 3

B Compare between mechanical waves and electromagnetic waves (definition, example).

C Write the chemical formula for each :

1. Aluminium oxide.
2. Sulphric acid.
3. Calcium carbonate.
4. Sodium hydroxide.

Question 3

A Write the scientific term :

1. Number of electrons gained or lost or shared during reaction.
2. Substance dissolves in water and gives negative hydroxide ion.
3. Property of object to resist change in its state from rest to motion.
4. Force produced inside nucleus.
5. Breaking bonds of reactants and forming new bonds in products.
6. Elements which are completely filled with electrons in the outermost energy level.

B Define : 1. Metals. 2. Periodic motion.

C Identify the type of each compound :

1. NaCl 2. CO_2 3. $Ca(OH)_2$ 4. MgO 5. HCl 6. AgCl

Question 4

A Give reasons for :

1. The presence of life on the Earth.
2. We see lightning before hearing thunder.
3. When an atom loses electrons it changes into positive ion.
4. Bond between oxygen molecules is a double covalent bond.
5. Potassium is monovalent while oxygen is divalent.
6. Policemen advise drivers to use safety belts in cars.

B Compare between :

Ionic bond and covalent bond (definition - example).

C Complete the following equations :

1. $NH_3 + HCl \xrightarrow{Conc.}$ ....
2. $2CO + O_2 \longrightarrow$ ....
3. $2Mg + O_2 \xrightarrow{\Delta}$ ....
4. $H_2 + Cl_2 \longrightarrow$ ....

Additional questions

A Choose the correct answer :

1. Planets revolve around the Sun in .... orbits.
   a. circular b. elliptical c. spiral
2. The big-sized, less dense planet which consists of gaseous elements is ....
   a. Earth. b. Mercury. c. Jupiter.

B Define :

1. Light year.
2. Asteroids.

10 Alexandria Governorate — Amena El-Saeid Lang. School

Answer the following questions :

Question 1

A Choose the correct answer :

1. The car brake performance is an application of ....
   a. attraction forces. b. friction forces. c. inertia.
2. Metamorphic rock produced as a result of the effect of the heat and pressure on the .... rocks.
   a. igneous b. sedimentary c. (a) and (b)
3. All of the following are periodic motion except ....
   a. the train motion. b. the pendulum. c. the light waves.
4. From the forces inside living systems : ....
   a. pulse inside blood vessels. b. inertia. c. brakes.
5. The outer layer of the Earth is called ....
   a. crust. b. mantle. c. outer core.

B Give reasons for :

1. White clouds are formed when ammonia gas reacts with conc. hydrochloric acid.
2. Presence of life on the surface of Earth's planet.
3. Safety belts are used in cars.
4. When an atom gains an electron more, it becomes a negative ion.

PART 3

C What happens if ... ?

1. The mechanical parts of machines are lubricated.
2. Meteors fall inside the atmosphere.

Question 2

A Complete the following :

1. The electric generator changes mechanical energy into .... energy.
2. Granite consists of .... , ... and mica.
3. The chemical formula of sodium hydroxide is ...., while the chemical formula of sulphuric acid is ....
4. $2NO + O_2 \xrightarrow{\Delta}$ ....

B Knowing that the mass of carbon = 12 and oxygen = 16, find the total mass of reactants and products of the following reaction :

$C + O_2 \xrightarrow{\Delta} CO_2$

C Explain the importance of :

1. Oxygen gas.
2. Carbon dioxide gas.

Question 3

A Write the scientific term :

1. Breaking of the bonds in the reactants molecules and forming new bonds in the products molecules.
2. The motion which is regularly repeated at equal periods of time.
3. It is an effect that attempts to change the object's state from being static to motion or vice versa.
4. Elements whose outermost shells are completely filled with electrons.
5. A set of symbols and chemical formulae expressing the reactants, products and reaction conditions.

B Give one example for :

1. Benefits of friction.
2. A metamorphic rock.

C State one difference between :

1. Mechanical and electromagnetic waves.
2. Inner and outer core.

Question 4

A Put (✓) or (✗) and correct the wrong one :

1. By increasing the ratio of carbon dioxide the temperature increases. ( )
2. The motion of a boy from his house to the school is a periodic motion. ( )
3. In the chemical reaction, the bonds of reactants and products are broken. ( )
4. An element, its atomic number is (20) so its valency is monovalent. ( )

B Calculate the mass of an object its weight is 980 newton and the Earth's gravitational acceleration is 9.8 m/sec^2.

C By drawing only show :

1. Electronic configuration to the atom of oxygen ($^{16}_{8}O$).
2. How two of its atoms are bonded to form oxygen molecule (O_2).

Additional questions

A Give a reason for :

1. The density of the inner planets is high.
2. Moons are considered the follows of the planets.

B Put (✓) or (✗) and correct the wrong one :

1. Halley's comet completes its rotation around the Sun each 67 years. ( )
2. Mars is from inner planets. ( )

11 Alexandria Governorate — Taymour English School

Answer the following questions :

Question 1

A Choose the correct answer :

1. The chemical formula of calcium hydroxide is ....
   a. NaOH b. $CaOH_2$ c. CaOH d. $Ca(OH)_2$
2. Marble is an example of .... rocks.
   a. plutonic b. sedimentary c. metamorphic d. volcanic
3. When an object moves with a distance 80 km each one hour, that means the speed is ....
   a. 80 m/sec. b. 80 km/sec. c. 80 km/h. d. 80 m/h.

PART 3

4. Which of the following represents (Al^{+3}) : .... (given that atomic number of Al is 13).

a. 2 , 8 b. 2 , 8 , 3 c. 2 , 8 , 8 , 3 d. 2 , 3 , 8

5. From the noble gases : ....

a. argon. b. sodium. c. chlorine. d. oxygen.

6. .... is a mechanical wave.

a. Water b. X-ray c. Light d. Infrared

7. The lower layer of Earth is ....

a. crust. b. upper mantle. c. core. d. lower mantle.

8. All of the following are insoluble salts except ....

a. PbI_2 b. NaCl c. AgCl d. $PbSO_4$

9. .... is a very thick liquid underneath the Earth's crust.

a. Lava b. Magma c. Crust d. Mantle

10. From the energies produced due to friction is ....

a. kinetic energy. b. mechanical energy.
c. potential energy. d. heat energy.

B $CO + O_2 \xrightarrow{\Delta} CO_2$

1. Calculate the mass of reactants and products.
2. Is this equation balanced ? Why ?
(The mass of C = 12 & O =16)

Question 2

A Give reasons for :

1. The valency of noble gases is zero.
2. The bond in (N_2) is a triple covalent bond (atomic number of N is 7).

B Complete the following :

1. .... and .... are accompanied forces to motion.
2. .... , ... and .... are 3 successive stages which help in formation of sedimentary rocks.
3. .... is from the suitable conditions to live on Earth.
4. .... is formed on burning of magnesium in air.
5. .... is an example of igneous rocks.

C If the mass of an object on Venus is 300 grams, calculate its weight if the gravitational acceleration of Venus is 8.87 m/sec^2.

Question 3

A What are the results of ... ?

1. Riding a moving car and stopping suddenly (why).
2. Reaction between ($_{11}$Na) and ($_{17}$Cl) (regarding the formed bond).
3. Putting a red litmus paper in sodium hydroxide and another one in hydrochloric acid.
4. Occurrence of lightning and thunder (regarding to arrangement and why).

B Mention one importance of :

1. Ultraviolet rays.
2. Safety belts.
3. Electromagnet.
4. X-rays.

Question 4

A Write the scientific term :

1. The compounds that are formed due to reaction between oxygen & metal or nonmetal.
2. The number of electrons gained, lost or shared during a chemical reaction.
3. The device that changes electric energy into mechanical energy.
4. The area on Earth at which gravitational force decreases.
5. A radical which consists of one nitrogen atom and three oxygen atoms.

B Put (✓) or (✗) :

1. Movement of simple pendulum is an example of circular motion. ( )
2. ($_{19}$K) is a metallic element. ( )
3. Covalent bond always forms compounds only. ( )
4. X-rays have thermal effect. ( )
5. The positive ion is called so, because number of positive protons is more than that of electrons. ( )
6. Gamma rays have medical uses. ( )
7. Evolving of (O_2) is a sign to differentiate between sandstone and limestone when hydrochloric acid is added to them. ( )
8. Pushing a wall is an improper force. ( )
9. The valency of zinc is 1. ( )

PART 3

Additional questions

A Correct the underlined words :

1. Inner planets are <u>gaseous</u> bodies.
2. <u>Microscopes</u> are used for identifying the celestial bodies.

B Give a reason for :

The object weight is changed from a planet to another.

12 Alexandria Governorate — Middle Educational Directorate

Answer the following questions :

Question 1

A Write the scientific term of the following :

1. Elements don't lose or gain any electrons during the chemical reaction.
2. A set of joined atoms behave as one atom during the chemical reaction.
3. It is an effect that changes the object phase from static to motion or vice versa, or changes the motion direction.
4. The motion of an object in which its position is changed relative to a fixed point.
5. A gas which is very important to decrease the effect of oxygen in burning processes in air.
6. A type of rocks resulted from fragmentation, transportation and deposition.

B If the Earth's gravitational acceleration in a place is 10 m/sec^2, find the mass of a body its weight is 50 newton.

C Complete the following table :

Name of compound	Chemical formula	Number of atoms in the molecule	Number of elements in the molecule
Calcium sulphate	....	....	....
....	$CuCO_3$	....	....

Question 2

A Correct the underlined words :

1. On burning magnesium strip in the presence of oxygen a **black** powder is formed.
2. Sulphur oxides are acidic gases affect the **nervous** system.

3. The electric generator converts the **heat** energy into an electric energy.
4. The inner core of Earth is rich in iron and **aluminium**.
5. The mantle is the **fourth** layer of Earth.
6. **Olivine, pyroxene** and feldspar are main minerals forming granite rock.

B **Mention one use for the following :**

1. Infrared rays.
2. X-rays.
3. Strong nuclear force.
4. Ozone layer.

C **Give reasons for the following :**

1. Lubricating and oiling mechanical machines.
2. Steadfastness of hydrosphere on Earth's surface.

Question 3

A **Complete the following statements :**

1. $2CO + O_2 \xrightarrow{\Delta}$ ....
2. In chemical reaction the total masses of reactants is .... the total masses of products.
3. The electromagnet is used in making ....
4. The outer layer of Earth is called ....
5. Regarding to the distance from the Sun, the Earth is in the .... order.
6. The volcanic igneous rocks formed from the .... flow in Earth's surface.

B **Compare between the following :**

1. Ionic bond and covalent bond (concerning the definition).
2. Sound waves and light waves (concerning the type of waves).

C **What happens in the following cases and why ... ?**

1. Approaching a wet rod with hydrochloric acid to ammonia gas (ensure your answer by chemical equation).
2. The passengers don't use safety belts in cars.

Question 4

A **Choose the correct answer :**

1. When an acid dissolves in water it produces .... ions.

a. H^- b. H^+ c. $(OH)^-$ d. $(OH)^+$

2. (Al_2O_3) is from ....

a. bases. b. salts. c. metal oxides. d. nonmetal oxides.

PART 3

3. From the examples of forces inside living systems : ....

a. pulse inside blood vessels. b. centrifugal forces.

c. brakes. d. all the previous.

4. Marble is resulted from the transformation of ....

a. igneous rocks. b. limestone.

c. sandstone. d. feldspar.

5. The plutonic igneous rocks have .... sized mineral crystals.

a. equal b. small c. medium d. large

6. The Earth layer which formed from molten metals is ....

a. mantle. b. outer core. c. inner core. d. core.

B Mention one example for :

1. A salt doesn't dissolve in water.
2. Circular motion.
3. Igneous volcanic rock.

C Write down the electronic configuration for the following elements $_{11}X$ and $_{17}Y$ then answer :

1. Mention the type of element for each one.
2. Mention the type of ion for each one.

Additional questions

A Choose the correct answer :

1. Comets, asteroids and meteors revolve around ....

a. the Sun. b. Jupiter. c. the Moon. d. the Earth.

2. The outer planets consist of some elements such as helium and hydrogen in .... state.

a. liquid b. gaseous c. molten d. solid

B What happens when ... ?

A huge solid rocky mass penetrates the atmosphere.

13 El-Qalyuobia Governorate — Memphis Language School

Answer the following questions :

Question 1

A Complete the following statements :

1. Sedimentary rocks are formed as a result of erosion , ... and ....

2. The force of gravity between two objects depends on .... and .... between them.
3. The bond in hydrogen molecule is a .... bond, while the bond in nitrogen molecule is a .... bond.
4. Electric generator changes .... energy into .... energy.
5. Waves are divided into two types, which are .... waves and .... waves.

B Problem :

An object, whose mass is 10 kg, calculate its weight knowing that the gravitational acceleration is 9.8 m/sec^2.

C Give reasons for :

1. Policemen advise divers to use safety belts in cars.
2. A chemical equation should be balanced.
3. Earth's inner core is rich in iron and nickel.
4. The presence of life on the surface of Earth planet only.

Question 2

A Write the scientific term :

1. A type of nuclear forces used in medicine and scientific researches.
2. An atom that doesn't give or gain any electron.
3. A molten material exists at depths beneath the crust.
4. Breaking the reactants bonds and forming new ones among the products.
5. A formula represents the number and the type of atoms in molecule.

B Compare between :

Metals and nonmetals.

C Write the chemical formula of the following compounds :

1. Silver chloride.
2. Sulphur trioxide.
3. Sodium sulphate.
4. Aluminium oxide.
5. Nitric acid.

Question 3

A What happens when ... ?

1. There is no atmosphere.
2. An atom loses one electron or more.
3. A moving bus stops suddenly.

PART 3

B Knowing that the mass of carbon (C) = 12 and oxygen (O) = 16, find the total masses of reactants and products through the following reaction :

$C + O_2 \longrightarrow CO_2$

C Indicate using symbolic equations, an example for the types of direct combination reaction between :

1. An element with another element.
2. An element with a compound.
3. A compound with another compound.

Question 4

A What is meant by ... ?

1. Valency. 2. Inertia. 3. Igneous rock.

B Put (✓) or (✗) and correct the wrong ones :

1. When ammonia gas reacts with hydrochloric acid, white powder is formed. ( )
2. Electromagnet converts the heat energy into electric energy. ( )
3. Simple pendulum motion is a wave motion. ( )
4. Fresh water represents 3% of the total volume of water on the Earth. ( )
5. Force is an attraction amount of the Earth to the body. ( )

C Mention the importance of :

1. Nitrogen gas. 2. Electromagnet. 3. Ozone layer.

Additional questions

A Complete the following statements :

1. The most famous comet is .... and it completes one rotation around the .... every 76 years.
2. The biggest planet in volume is .... and the nearest planet to the Sun is ....

B Write the scientific term :

1. The region which separates between the group of the inner planets from that of the outer planets.
2. Small space bodies that are affected by the planet's gravity.

14 El-Sharkia Governorate — Omar Al-Farouk Lang. School

Answer the following questions :

Question 1

A Complete the following :

1. The type of bond in hydrogen molecule is .... bond, while in nitrogen molecule is .... bond.
2. Limestone changes into marble when exposed to high .... and ....
3. Ground water exists in the .... of the rocks that form the Earth's mass.
4. Example of vibrating motion is ...., while transitional motion is .... motion.
5. $2CO + O_2 \xrightarrow{\Delta}$ ....

B Write the electronic configuration of : $_{17}Cl$, $_{18}Ar$

Then indicate :

1. The type of each atom. (metal , nonmetal , noble)
2. The type of each ion. (positive , negative , no ion)

C Mention the importance of the following :

1. The ozone layer. 2. Ultraviolet rays. 3. Strong nuclear forces.

Question 2

A Write the scientific term :

1. Natural solid material exists in the Earth's crust and it is formed of one mineral or a group of minerals.
2. The force of the Earth's gravitational to an object.
3. Breaking the reactants bonds and forming new ones among the products.
4. The number of electrons that an atom gains, loses or even shares during a chemical reaction.
5. The layer of the Earth that lies beneath the Earth's crust.

B Compare between each two of the following :

1. The Earth's outer core and inner core (according to structure and thickness).
2. Electric generator and electric motor (according to energy transformations).
3. Plutonic rocks and volcanic rocks (according to formation and example).

PART 3

C **Write the chemical formula of the following compounds :**

1. Sulphur trioxide.
2. Ammonium carbonate.
3. Aluminium sulphate.

Question 3

A **Give reasons for :**

1. Noble elements don't need a chemical combination with any other atoms.
2. Policemen advise drivers to use safety belts in cars.
3. Temperature on the Earth's surface suits the life of living organisms.
4. We see lightning before hearing thunder.

B **Find the total masses of reactants and products through the following reaction :**

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$ (knowing that the mass of : Mg = 24 and O = 16).

C **Show by a diagram :** How two atoms of oxygen ($_8O$) are bonded to form oxygen molecule (O_2).

Question 4

A **Choose the correct answer :**

1. .... are used in night vision devices.
   a. Gamma rays b. X-rays c. Ultraviolet rays d. Infrared rays
2. .... oxides are resulted during time of lightning.
   a. Carbon b. Sulphur c. Fuel d. Nitrogen
3. The car brake is one of the applications of .... forces.
   a. inertia b. nuclear c. gravitational d. friction
4. The normal atmospheric pressure equals .... cm.Hg.
   a. 76 b. 67 c. 70 d. 72
5. The number of the Earth's layers are ....
   a. 3 b. 5 c. 2 d. 1
6. The measuring unit of force is ....
   a. newton b. kilogram. c. metre/sec^2. d. metre/sec.

B **How can you differentiate between each of the following :**

1. Sandstone and limestone. [by adding (HCl) for each one].
2. Potassium sulphate salt and lead sulphate salt (by adding water for each one).

C **Calculate the mass of an object its weight is 980 newton and the Earth's gravity is 9.8 m/sec^2.**

Additional questions

A Choose the correct answer :

1. .... emit large amounts of heat and light.
   a. Stars b. Galaxies c. Planets d. Moons
2. The distance between stars are measured in .... unit.
   a. metre b. kilometre c. newton d. light year

B Give reasons for :

The stars seem as light points although they are huge.

15 El-Menofia Governorate — Quesna Educational Directorate

Answer the following questions :

Question 1

A Complete the following :

1. (NaCl) has .... bond while (HCl) has .... bond.
2. The motion of simple pendulum is .... motion while the motion of train is .... motion.
3. The electric motor changes .... energy into .... energy.
4. The .... layer protects living organisms from harmful .... rays.
5. The Earth consists of 3 main layers .... , ... and ....

B If the Earth's gravity acceleration in a place (9.8 m/sec^2) find the weight of (0.3 kg) mass ball.

C Knowing that the mass of (Mg) = 24 and the mass of (O) = 16 find the total masses of reactants and products in the reaction : $2Mg + O_2 \longrightarrow 2MgO$

Question 2

A Put (✓) or (✗) :

1. The Earth's inner core is rich in iron and aluminium. ( )
2. Water waves is mechanical waves. ( )
3. Fresh water is 4% of the total water on the Earth. ( )
4. The metamorphic rocks formed only by high temperature. ( )
5. The normal atmospheric pressure is 70 cm.Hg. ( )

PART 3

B Complete the following equations and determine the type of the reaction :

1. $C + O_2 \longrightarrow$ ....
2. $NH_3 + HCl \longrightarrow$ ....

C Write the formula of :

1. Sodium oxide.
2. Copper sulphate.
3. Calcium carbonate.

D Write the type of each compound :

1. SO_3
2. $PbSO_4$
3. $Ca(OH)_2$
4. HNO_3

Question 3

A Choose the correct answer :

1. The Earth's gravitational acceleration is changed from place to another because of ....
   a. object's mass. b. temperature. c. the distance from the Earth's centre.
2. The marble rock is considered from .... rocks.
   a. igneous b. sedimentary c. metamorphic
3. The car brake performance is application of ....
   a. attraction force. b. friction force. c. nuclear force.
4. .... is an oxide which causes building corrosion.
   a. MgO b. SO_2 c. CaO
5. The gas which reduces the effect of oxygen in burning process is ....
   a. CO_2 b. N_2 c. H_2O

B Give reasons for :

1. Policemen advise drivers to use safety belts in cars.
2. The presence of life of surface of the Earth. (4 points)

Question 4

A Write the scientific term :

1. The distance covered by an object in a unit time.
2. The chemical compound is produced from combination of its elements by constant weight ratios.
3. A motion which is repeated in equal periods of time.
4. The property of an object that has to resist the change of its phase of rest or motion.
5. The chemical bond which arises between two nonmetal atoms, where each atom shares the other atom with three electrons.

B Write one application to each of :

1. Gamma rays.
2. Weak nuclear force.
3. Ultrasonic waves.
4. Lubricants.

Additional questions

A Put (✓) or (✗) in front of the following statements :

1. The stars, planets and moons are celestial bodies. ( )
2. The celestial bodies are in a permanent motion according to the will of Allah. ( )
3. The Milky Way galaxy takes an oval shape with straight arms. ( )

B Give reasons for :

Astronomers do not measure the distance between stars in kilometres.

16 El-Gharbia Governorate — Kafr El-Zayaat Educational Directorate

Answer the following questions :

Question 1

A Complete the following statements :

1. The chemical reaction is the process in which bond existing in the reactants are .... and forming new bonds in the ....
2. Lubricating and oiling mechanical machines reduce .... between moving parts and prevent their ....
3. Electromagnet changes the .... energy into .... energy.
4. Thunder sound transfers in a form of .... waves, whereas lightning flask transfers in a form of .... waves.
5. The Earth's inner core contains .... and .... in a solid state.
6. Limestone consists of the precipitation of .... in .... solution.

B Give reasons for each of the following :

1. A sodium atom ($_{11}Na$) tends to form a positive ion, while oxygen atom ($_8O$) tends to form a negative ion.
2. The fan is going to turn after the electric current goes off.

C Calculate the mass of reactants and products in the following reaction :

$C + O_2 \xrightarrow{\Delta} CO_2$ [knowing that the mass of O = 16 & C = 12].

Question 2

A Write the scientific term, which refers to each of the following statements :

1. Compounds dissolved (dissociated) in water producing positive H^+ ions.

PART 3

2. An effect that attempts to change the object's phase from being static to motion or vice versa.
3. A motion which is regularly repeated in equal periods of time.
4. A technological application is used in cars and planes to stop the forces of inertia when a sudden change in motion occurs.
5. The layer of atmosphere, which protects the Earth and living organisms from the harmful ultraviolet radiations.
6. A natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.

B What is meant by ... ?

1. Nuclear force.
2. Metamorphic rocks.

C Two elements (X) and (Y), their atomic numbers are (11 and 17) respectively, answer the following questions :

1. Write the electronic distribution of each one.
2. Write the valency of each one. Give a reason.
3. What is the type of the compound produced due to their combination ?

Question 3

A Choose the correct answer :

1. When a nitrogen atom ($^{14}_{7}N$) gains electrons to complete its outermost shell, it becomes ....
   a. N^{-2} b. N^{-3} c. N^{+2} d. N^{+3}
2. An object's weight on the Earth's surface is related to .... force.
   a. electromagnetic b. weak nuclear c. strong nuclear d. gravitational
3. When a moving bus stoped suddenly, the passengers and the driver ....
   a. rushed backward. b. rushed forward. c. rushed left. d. rushed right.
4. When two cars move in the opposite direction with a velocity 60 km/h., the driver of the first car imagines that the second car moves with velocity .... km/h.
   a. zero b. 30 c. 60 d. 120
5. Regarding the volume, the Earth occupies the .... order (ascendingly) in the solar system.
   a. second b. third c. fourth d. fifth
6. All of the following are minerals, that form the basalt rock except ....
   a. mica. b. olivine. c. feldspar. d. pyroxene.

B What happens when ... ?

1. Burning of coal and cellulose fibres.
2. The magma comes out of the Earth's surface.

C Give one difference between :

1. O_2 and 2O.
2. The formation of the mantle layer and outer core layer.

Question 4

A Correct the underline words :

1. **Sulphur oxides** are poisonous acidic gases that affect the nervous system and the eye.
2. **The electric generator** converted the electric energy into a mechanical energy.
3. **X-rays** are used in sterilizing the sets of surgical operations rooms.
4. **Inertia** is the change in an object's position or direction as time passes in proportion to another object.
5. Plants use **carbon dioxide** gas to form protein.
6. Marble rock is **pink** if it is pure.

B Write the balance chemical equations representing the following reactions :

1. Reaction of ammonia gas and hydrochloric acid.
2. Reaction of nitrogen monoxide and oxygen.
3. Reaction of magnesium and oxygen.

C Calculate the weight of an object, if it's mass is 30 kg and the Earth's gravitational acceleration is 9.8 m/sec^2.

Additional questions

A What happens when ... ?

1. You look at the sky in a clear moonless night.
2. We can't invent the telescope.

B Choose the correct answer :

1. The distance covered by the light in one year is called ....
   a. astronomical unit
   b. light year.
   c. speed of light.
   d. kilometre
2. Astronomers measure the distances between stars with light year, because the stars ....
   a. generate great amounts of light and heat.
   b. are near from each other.
   c. are millions of kilometres away from us.
   d. seem as small light points.

PART 3

17 El-Dakahlia Governorate — Educational Directorate

Answer the following questions :

Question 1

A Choose the correct answer :

1. All of the following are covalent molecules except ....
   a. H_2O b. MgO c. HCl
2. Car brake is one of the applications of .... force.
   a. friction b. nuclear c. inertia
3. The measuring unit of weight is ....
   a. kilometre. b. kilogram. c. newton.
4. .... is the two oxygen molecules.
   a. O_2 b. $2O_2$ c. 2O
5. .... is/are considered as mechanical waves.
   a. Infrared rays b. Visible light c. Sound waves
6. The valency of helium ($_2He$) is ....
   a. 0 b. 1 c. 2
7. From sedimentary rocks ....
   a. limestone. b. basalt. c. marble.

B Fill in the following table :

	Compound	Formula	No. of atoms	No. of elements
1	Lead iodide	....	3	....
2	....	$NaNO_2$	....	3

C What is the meant by ... ?

1. Inertia. 2. Chemical equation. 3. Transitional motion.

Question 2

A Problem :

If the Earth's gravitational acceleration is 10 m/sec^2. Find the weight in newton of 300 gm mass ball (1 kg = 1000 gm).

B Give reasons for :

1. The Earth is suitable for life.
2. Potassium ($_{19}K$) is monovalent, while ($_{8}O$) oxygen is divalent.

C Write the scientific term :

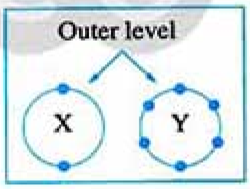
1. It is a motion which is regularly repeated in equal periods of time.
2. They are waves which spread in all media and free space like light.
3. Chemical bond arises between two nonmetals where each atom shares with two electrons.
4. They are used to sterilize the sets of surgical operations rooms.
5. It converts the mechanical energy into an electric energy.
6. Elements don't participate in any chemical reaction in ordinary conditions.
7. It is a resistance force originated between the object in motion and the medium touching it.

Question 3

A Put (✓) or (✗) :

1. The Earth locates in the third arrangement regarding the distance from the Sun. ( )
2. All nonmetals are bad conductors of electricity. ( )
3. Atmosphere contains ozone layer which protects us from harmful ultraviolet rays. ( )
4. Silver chloride (AgCl) dissolves in water. ( )
5. Lubricating and oiling reduce friction between moving parts. ( )
6. Acids change the colour of red litmus paper into blue. ( )
7. Hydrogen ($_{1}H$) is a metal as it has one electron in outermost energy level. ( )

B Study the opposite figure :



Two atoms (X) and (Y), the first contains two electrons in the third level, the second contains six electrons in the second level as shown. During the chemical reaction between (X) and (Y), a chemical bond is formed between them. Fill in the following table :

The type of (X) atom	The type of (Y) atom	Formula of the formed compound	The type of this bond
....	....	....	....

C Write the chemical equations representing the following :

1. Reaction of ammonia gas with hydrochloric acid.
2. Burning of carbon in presence of oxygen.
3. Heating magnesium ribbon in air.

PART 3

Question 4

A Problem :

Calculate the masses of reactants and products in the following reaction.

$HCl + NaOH \longrightarrow NaCl + H_2O$ [knowing that the mass of H = 1, Cl = 35.5 , Na = 23, O = 16].

B Fill in the following table :

	Atomic group	Formula	Valency
1	Bicarbonate	....	1
2	....	PO_4	3
3	Sulphate	SO_4	....

C Correct the underlined words :

1. **Fresh** water represents 97% and exists in oceans and seas.
2. **Bases** dissociate in water producing positive hydrogen H^+ ions.
3. (CO_2) is a **metal** oxide.
4. **Positive** ion is an atom of nonmetallic element that gains an electron or more.
5. Passengers are rushed **forward** when the car at rest moves forward suddenly.
6. **Mass** of an object is the Earth's ability to attract that object.
7. Electromagnet works on changing **heat** energy into magnetic energy.

Additional questions

Write the scientific term of each of the following :

1. Any body swims in the space as stars, planets, moons, rocky and gaseous bodies.
2. Large bodies seem as points in the sky emitting enormous amounts of heat and light.
3. The distance covered by light in one year.

18 Ismailia Governorate — Educational Directorate

Answer the following questions :

Question 1

A Complete the following sentences :

1. .... gas reduces the effect of oxygen during burning.

2. During the chemical reaction, sodium atom ($^{23}_{11}Na$) .... one electron and changes into positive ion.
3. The work done to lift an object .... by increasing the object's mass.
4. Marble is resulted from the transformation of .... rock.
5. On dissolving in water, ... produce positive hydrogen ions.
6. Increasing the ratio of .... gas in air causes greenhouse phenomenon.
7. Friction causes a great loss of .... energy, as it is changed into heat energy.
8. .... are used in photographing bones.

B Give reasons for the following :

1. The crystals of minerals that form the plutonic igneous rocks are large in size.
2. Car passengers are rushed forward, when the car stopped suddenly.
3. We see lightning before hearing thunder, although both occur at the same time.
4. Temperature on the Earth suits the life of living organisms.

C Complete the following equations :

1. $2Mg + O_2 \xrightarrow{\Delta}$ ....
2. $2CO + O_2 \xrightarrow{\Delta}$ ....

Question 2

A Write the scientific term :

1. A layer in the Earth, which is rich in iron and nickel.
2. The number of electrons gained, lost or even shared by an atom during the chemical reaction.
3. A type of electromagnetic rays which have heat effect.
4. The molten material that exists at the depth under the curst.
5. An instrument used to change electric energy into mechanical energy.
6. Breaking bonds in reactants and forming new bonds in products.
7. A bond resulting from electric attraction between a positive ion and a negative ion.

B Compare between the following :

1. Mercury and bromine [according to the type of element (metal or nonmetal)].
2. Strong nuclear force and weak nuclear force [according to the use].

C Write the chemical formula for the following :

1. Aluminium oxide. 2. Sodium chloride. 3. Calcium sulphate.

PART 3

Question 3

A Who am I ... ?

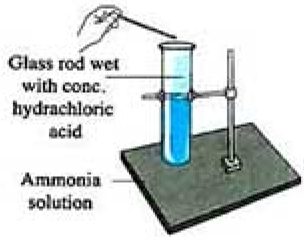
1. I am an igneous rock, consists of pyroxene, olivine and feldspar.
2. I am a type of compounds, turns litmus paper into blue.
3. I am a layer inside the Earth, consists of molten metals.

B Mention the importance or uses of the following :

1. Water in continuity of life (2 points are enough).
2. Gamma rays.
3. Friction force (1 point is enough).

C Examine the opposite figure, then answer :

1. What do you observe ?
2. Write the equation of this reaction.



D Find the weight of a ball which its mass = 0.5 kg if the gravity acceleration = 9.8 m/sec^2.

Question 4

A Choose the correct answer :

1. .... is an example of sedimentary rocks.
   a. Basalt b. Sandstone c. Granite d. Marble
2. The covalent bond happens between .... elements.
   a. two metallic b. two nonmetallic c. metal & nonmetal d. two inert
3. The Earth is characterized by the presence of suitable .... of about 76 cm.Hg.
   a. pressure b. temperature c. gravity d. hydrosphere
4. The amount of the Earth attraction force on an object is called ....
   a. weight. b. mass. c. centrifugal force. d. no correct answer.
5. The friction force is always in .... direction to motion.
   a. same b. opposite c. perpendicular d. parallel
6. .... oxides are resulted during lightning.
   a. Carbon b. Sulphur c. Nitrogen d. No correct answer

B What happens when ... ?

1. Burning of coal and cellulose fibres (concerning its effect on air).
2. Two oxygen atoms combine together (concerning the type of formed bond).
3. Adding (HCl) hydrochloric acid to limestone rock.

Ⓒ **Knowing that the mass of carbon (C) is 12 and oxygen (O) is 16 find the mass of reactants and products of the following reaction :**

$C + O_2 \xrightarrow{\Delta} CO_2$

Additional questions

Complete the following statements :

1. Any body swims in the space is called ....
2. .... are large round bodies generating large amounts of heat and light.
3. The distance covered by the light in one year is called ....
4. The galaxy that our solar system belongs to is called .... or The Way of ....

19 Port-Said Governorate — Educational Directorate

Answer the following questions :

Question 1

Ⓐ **Complete the following statements :**

1. On dissolving acids in water, they give .... ions, while on dissolving bases in water, they give .... ions.
2. .... rays are used in remote sensing instruments.
3. The .... layer in atmospheric air protects living organisms from the harmful rays.
4. $2CO + O_2 \xrightarrow{\Delta}$ ....
5. Granite is from .... rocks, but limestone is from .... rocks.

Ⓑ **Give reasons for :**

1. The car passengers are rushed forward when the car stopped suddenly.
2. Nobel gases don't participate in chemical reactions under the ordinary conditions.
3. The presence of life on the surface of the Earth's planet only.

Ⓒ **Give one example for each of the following :**

1. Mechanical waves.
2. An apparatus depends in its working on electromagnetic waves.
3. The metamorphic rocks.

PART 3

Question 2

A Choose the correct answer :

1. The car brake performance is an application of ....
   a. attraction forces. b. friction forces. c. centrifugal forces. d. forces of inertia.
2. The chemical formula of sulphuric acid is ....
   a. H_2O b. HCl c. H_2SO_4 d. HNO_3
3. All the following are periodic motions except the .... motion.
   a. fan b. pendulum c. train d. sunflower
4. The weight of the objects is measured in ....
   a. kilogram. b. coulomb. c. m/sec^2. d. newton.
5. The gases that cause building corrosion are ....
   a. nitrogen oxides. b. carbon dioxide. c. sulphur oxides. d. both (a) & (b).
6. The outer layer of the Earth is called the .... layer.
   a. crust b. mantle c. inner core d. outer core

B Calculate the mass of an object weight 98 newton (knowing the Earth's gravity = 9.8 m/sec^2).

C Define the following :

1. Negative ion. 2. Object's weight. 3. Acids.
4. Inertia. 5. The atomic group.

Question 3

A Write the scientific term for the following sentences :

1. It is an affect that attempts to change the object's phase from being static to motion or change the motion direction.
2. Elements have luster, are good conductors of heat and electricity and they contain 1, 2 or 3 electrons in their outermost shells.
3. A set of symbols and chemical formulae expressing the reactants and the products molecules in the chemical reaction.
4. A bond resulting from the electric attraction between a positive ion and a negative ion.
5. A very hot thick liquid which exists underneath the Earth's crust.
6. An atom of an element that doesn't give or lose any electrons.
7. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
8. It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.

B Compare between the following :

1. Transitional motion and periodic motion.
2. Electric generator and electric motor. 3. Acids and bases.

Question 4

A Put (✓) or (✗) and correct the wrong :

1. The Earth radius between the two poles is larger than that at the equator. ( )
2. Quartz mineral is the main compound in granite rock. ( )
3. The water bodies represent about 50 % of the Earth's surface. ( )
4. Oxides are substances that dissociated in water producing H^+ ions. ( )
5. Inner core layer of the Earth is rich in iron and nickel. ( )
6. When ammonia gas reacts with hydrochloric acid, white clouds is formed. ( )

B On a diagram show the electronic configuration to the atom of oxygen ($_8O$) then show how its two atoms are bonded to form oxygen molecule (O_2).

C What do you expect in the following cases :

1. When an electric current passes through an insulated copper wire coiling around a bar of soft iron.
2. Don't use the safety belts in cars.
3. Heating magnesium in air.
4. There is no atmosphere.

Additional questions

A Put (✓) or (✗) :

1. Reflecting and refracting microscopes are used for identifying the celestial bodies. ( )
2. The Sun is our planet in the solar system. ( )
2. There are eight spherical lightened planets revolve around the Sun. ( )

B Give reasons for :

No one can see Halley's comet more than two times in his life.

PART 3

20 Damietta Governorate — Educational Directorate

Answer the following questions :

Question 1

A Complete the following :

1. The bond in sodium chloride molecule is .... bond while the bond in water molecule is .... bond.
2. The force of gravity between two objects depends on .... and ....
3. The electric motor works on converting .... energy into .... energy.
4. On dissolving in water, acids give positive .... ions and alkalis give negative .... ions.
5. Electromagnet is used to make .... and ....

B Give difference between :

1. Plutonic and volcanic rocks.
2. Sandstone and limestone.

C Write the chemical formula for the following :

1. Magnesium oxide.
2. Aluminium hydroxide.

Question 2

A Write the scientific term :

1. The number of electrons that an atom gains, loses or even shares during chemical reaction.
2. The motion which is regularly repeated in equal periods of time.
3. Elements don't participate in chemical reactions under the ordinary conditions.
4. The property of an object resistance to change its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

B Give one example of each of the following :

1. Metamorphic rocks.
2. Electromagnetic waves.

C Write the electronic configuration to the following atoms :

($^{24}_{12}Mg$) - ($^{35}_{17}Cl$) then indicate :

1. Type of ion.
2. Type of element.

Question 3

A Choose the correct answer :

1. Weight is measured in ....
   a. joule. b. newton. c. kilogram. d. richter.
2. All of the following are metals except ....
   a. iron. b. copper. c. oxygen. d. sodium.
3. The inner core of the Earth is a solid layer rich in ....
   a. sodium. b. aluminium. c. coal. d. iron.
4. Cars brakes idea is one of the applications of .... force.
   a. gravitational b. nuclear c. friction d. inertia
5. There are some examples of sedimentary rocks such as ....
   a. marble. b. basalt. c. granite. d. limestone.

B Knowing that the mass of carbon (C = 12) and oxygen (O = 16).

Find the total masses of reactants and products through the following :

$C + O_2 \xrightarrow{\Delta} CO_2$

C Define :

Force.

Question 4

A Give reasons for :

1. Temperature on the Earth's surface suits the life of living organisms.
2. Potassium ($_{19}K$) is monovalent while oxygen ($_{8}O$) is divalent.
3. We see lightning before hearing the thunder.
4. Car tyres are covered with a very coarse substance.
5. The bond in water molecule is a single covalent bond.

B Correct the underlined words :

1. The chemical formula for sodium chloride is **($NaCl_2$)**.
2. Green plants use **oxygen** gas during photosynthesis process.
3. **Chemical reaction** is a set of atoms joined together, behave like one atom, having its own valency and is not existed solely.
4. $NH_3 + HCl \xrightarrow{Conc.} \mathbf{NH_4OH}$

PART 3

Additional questions

A Complete the following statements :

1. The nearest planet to the Sun is .... and the farthest one from the Sun is ....
2. The biggest planet in volume is .... and the highest one in density is ....

B Write the scientific term :

1. Solidified masses of ice, gases and rock pieces revolve around the Sun.
2. The most famous comet which completes its revolution around the Sun each 76 years.

21 El-Behira Governorate — Ismail Elhabrouk Formal Language School

Answer the following questions :

Question 1

A Choose the correct answer :

1. The idea of machine lubrication depends on the lessening of the ....
   a. object's weight. b. inertia. c. friction force. d. gravity.
2. All of these are nonmetal oxides except ....
   a. CO_2 b. P_2O_5 c. SO_3 d. Al_2O_3
3. The solid layer in the Earth that rich in iron and nickel is ....
   a. crust. b. mantle. c. outer core. d. inner core.
4. The number of electrons in the outermost energy level in ($_{17}Cl$) is ....
   a. 17 b. 18 c. 8 d. 7

B Give reasons for :

1. The car passengers are rushed forward when the moving car stops suddenly.
2. Chemical equation should be balanced.
3. The crystals of the minerals that form the plutonic igneous rocks are large in size.
4. Ionic bonds produce compounds only not elements, but the covalent bonds produce both types, an element or even a compound.

C Write the chemical formula for each of the following :

1. Copper nitrate. 2. Caustic soda.
3. Calcite. 4. Sulphoric acid.

Question 2

A Complete the following :

1. Burning cellulose fibres causes .... but carbon monoxide causes ....
2. Sandstone belongs to .... rocks, while marble belongs to .... rocks.
3. Electric motor changes .... energy into .... energy.
4. .... layer of atmosphere protects living organisms from .... rays.

B What happens in each of the following ... ?

1. Increasing of (SO_2) and (SO_3) in air (concerning building).
2. Limestone rocks subjected to high temperature and pressure.

C Knowing that the mass of magnesium = 24 and oxygen = 16. Find the total masses of reactants and products through the following reaction :

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$

Question 3

A Write the scientific term for each of the following :

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
2. The motion which is regularly repeated in equal periods of time.
3. Compound is produced from a chemical combination of its elements by constant weight ratios.
4. A rock formed of lava flows when it comes on the Earth's surface.

B Write the balanced symbolic chemical equations which represent :

1. Burning a piece of coal in air.
2. Reaction between ammonia and concentric hydrochloric acid.

C The following figures represent the electronic configuration for the outermost energy level of four atoms of elements, their electrons revolve in two energy levels.



a. b. c. d.

Answer the following :

1. What is the element which its valency is monovalent ?
2. What is the element which considered from nonmetals ?
3. What is the element whose nucleus contains 3 protons ?

PART 3

Question 4

A Mention one application for each of the following :

1. Infrared rays.
2. Useful effect of chemical reactions.
3. X-rays.
4. Strong nuclear force.

B The weight of an object on a planet is 32 N and on the Earth is 80 N. What is the gravitational acceleration on this planet. Knowing that the gravitational acceleration on the Earth is 10 m/sec^2.

C Show by drawing : The combination between two hydrogen atoms to form hydrogen molecule and indicate the type of bond.

Additional questions

A Give reasons for :

1. Sometimes, we see some luminous lines in the sky at clear nights.
2. The object weight is changed from a planet to another.

B Put (✓) or (✗) :

1. The paths of planets lie on one plane perpendicular to the Sun's axis of rotation around itself. ( )
2. The small or inner planets are Mercury, Venus, Earth and Saturn. ( )

22 Fayoum Governorate — Educational Directorate

Answer the following questions :

Question 1

A Complete the following :

1. The .... layer in the atmospheric air protects living organisms from the harmful rays.
2. The Earth consists of a number of arranged layers from the surface to the centre : the crust, ... and ....
3. The chemical formula of hydrochloric acid is .... but the chemical formula of sodium hydroxide is ....
4. The bond in magnesium oxide molecule is ...., but the bond in molecule of water is ....

5. .... rays are used in remote sensing instruments.

6. Granite is from .... rocks but limestone is from .... rocks.

B Define :

1. Positive ion. 2. Periodic motion.

C Write the chemical equation representing the following reaction, then indicate the type of reaction :

The reaction between carbon monoxide with oxygen.

Question 2

A Correct the underlined words in the following statements :

1. Inner core of the Earth is rich in iron and **aluminium**.
2. Quartz, feldspar and **olivine** minerals are main compounds in granite rock.
3. **Mass** is an attraction force of the Earth to a body.
4. Electric generator (dynamo) converts the **heat** energy into electric energy.
5. **Oxides** are substances that dissociate in water producing positive hydrogen ions.
6. When **oxygen** gas reacts with hydrochloric acid, white clouds is formed.

B Give one example for each of the following :

1. The igneous volcanic rock.
2. Mechanical waves.
3. Nonmetal liquid element.
4. Salt dissolves in water.

C Mention one application for each of the following :

1. Visible light. 2. Ultraviolet rays.

Question 3

A Write the scientific term for each of the following statements :

1. Elements don't participate in chemical reactions under the ordinary conditions due to the completeness of their outermost energy levels with electrons.
2. It is the motion of an object in which its position is changed relative to a fixed point.
3. It is any natural material that exists in the Earth's crust and is formed of one mineral or a group of minerals.
4. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
5. Breaking of the existing bonds in the reactants molecules and forming of new bonds in the products molecules.

PART 3

B Choose the correct answer to complete the following statements :

1. Oxygen is from ....
   a. acids. b. bases. c. metallic elements. d. nonmetallic elements.
2. The idea of machine lubrication depends on the decreasing of the ....
   a. object's weight. b. inertia. c. friction force. d. gravity.
3. Which of the following is considered as a circular motion ....
   a. fan motion. b. pendulum motion.
   c. car motion. d. sunflower plant motion.
4. The metamorphic rock is produced as a result of the effect of the heat and pressure on the ....
   a. igneous rocks only. b. sedimentary rocks only.
   c. metamorphic rocks only. d. igneous & sedimentary rocks.
5. Water bodies on the Earth's surface form the percentage of ....
   a. 50 % b. 71 % c. 40 % d. 30 %

C What would happen in each of the following ... ?

1. Carbon burning in the presence of oxygen (write the equation).
2. The car stops suddenly.

Question 4

A Give reasons for :

1. We see lightning before hearing thunder.
2. Burning of coal and cellulose has bad effects.
3. The presence of life on the surface of the Earth's planet only.

B Problem :

Calculate the mass of an object weights 98 newton (knowing the Earth's gravity = 9.8 m/sec^2).

C Compare between : Limestone and sandstone (according to main mineral).

D Write down the electronic configuration of the atoms of the following elements ($_{12}$Mg) – ($_{18}$Ar) then indicate :

1. The type of each atom (metal – nonmetal – noble gas).
2. The type of each ion (positive – negative – no ion).

Additional questions

Complete the following statements :

1. The comet consists of two parts, which are .... and ....
2. The head of the comet consists of a mixture of solidified gases of carbon dioxide, ... and .... gases and other components.
3. Telescopes are used for identifying the ....
4. The most famous comet that the inhabitants of the Earth could observe is .... and it completes its revolution around the Sun every .... years.

23 Assiut Governorate — Educational Directorate

Answer the following questions :

Question 1

A Complete the following sentences :

1. .... rays are used in remote sensing instruments.
2. Ground water exists in the .... of the rocks that forming the Earth's mass.
3. $2CO + O_2 \xrightarrow{\Delta}$ ....
4. In the periodic motion, the motion is ....
5. The Earth's inner core is rich in .... and ....
6. $NH_3 + HCl \longrightarrow$ ....
7. From the examples of forces inside living organisms is pulse inside ....

B Calculate the mass of an object, its weight is 96 newton (knowing that the Earth's gravity acceleration = 9.6 m/sec^2).

Question 2

A Write scientific term :

1. A bond resulting from the participation of each of the 2 atoms with 3 electrons.
2. The property of an object that has to resist the change of its state of rest or motion at a regular speed unless a force effects on it.
3. The number of electrons gained, lost or even shared by an atom during chemical reaction.
4. An atom of an element doesn't lose or gain any electrons.
5. An object position changes with the time passes from its an initial position to a different final one.

PART 3

6. A rock formed of lava flows when it comes on the Earth's surface.
7. The force of the Earth's attraction to an object.

B The following formulae represent some molecules, name each one :

1. $NaNO_3$ 2. $Al_2(SO_4)_3$ 3. $CaCO_3$

C Which of the following rocks is sedimentary, igneous or metamorphic ?

1. Granite. 2. Sandstone.
3. Marble. 4. Basalt.

Question 3

A Choose the right answer :

1. The gas which responsible for the greenhouse effect is .... gas.
 a. CO_2 b. SO_2 c. NO_2 d. CO
2. Water masses on the Earth's surface form about ....
 a. 30 % b. 50 % c. 71 % d. 90 %
3. The idea of mechanism of lubricant depends on decreasing of .... force.
 a. friction b. inertia c. gravity d. nuclear
4. Regarding the volume, the Earth occupies the .... order (ascendingly) in the solar system.
 a. fifth b. fourth c. third d. eighth
5. All the following are periodic motion except .... motion.
 a. fan b. pendulum c. train d. water wave
6. .... are used in examination of bone.
 a. Gamma rays b. Ultraviolet rays c. X-rays d. Infrared rays

B Knowing that the mass of carbon (C = 12) and oxygen (O = 16) find the total masses of reactants and products through the following reaction :

$C + O_2 \xrightarrow{\Delta} CO_2$

C Compare between :

1. Electric generator and electric motor.
2. The crust and the mantle.

Question 4

A Give reasons for :

1. Potassium ($_{19}K$) is monovalent where oxygen ($_8O$) is divalent.
2. Effervescence takes place when hydrochloric acid is added to a sample of limestone.
3. We receive the sunlight at the same time we don't hear the sound of solar explosions.

B **Write the chemical formula for the following molecules :**

1. Magnesium oxide. 2. Calcium chloride.
3. Sulphuric acid. 4. Aluminium hydroxide.

C **What do you mean by ... ?**

1. Chemical reaction. 2. Rock.
3. Relative motion. 4. Acids.

Additional questions

A **What happens when ... ?**

1. A large asteroid penetrates the Earth's atmosphere.
2. Friction of meteors with the Earth's atmosphere.

B **Complete the following :**

1. The belt of the wanderer asteroids separates between the orbits of .... and .... planets.
2. The luminous arrows, that can be seen in the sky at clear nights are called ...., while the large rocky masses, that don't burn up completely and fall on the Earth are called ....

24 Sohag Governorate — El-Balina Educational Directorate

Answer the following questions :

Question 1

A **Complete the following statements :**

1. The bond in sodium chloride molecule is .... bond whereas the bond in water molecule is .... bond.
2. Sedimentary rocks are formed as a result of .... , ... and ....
3. Waves are divided into two types which are .... waves and .... waves.
4. The .... layer in the atmospheric air protects living organisms from the harmful rays.

B **Write the chemical formula for the following molecules :**

1. Sodium sulphate. 2. Copper nitrate.
3. Calcium chloride. 4. Aluminium hydroxide.

PART 3

C What's meant by ... ?

1. Valency.
2. The ion.

Question 2

A Write the scientific term :

1. A formula represents the number and types of atoms in a molecule.
2. The force of the Earth's attraction to an object.
3. A natural solid material that exists in the crust and consists of one mineral or a group of minerals.
4. A movement repeated regularly in equal intervals of time.

B Give reasons for :

1. A chemical equation should be balanced.
2. Gravitational acceleration is change on the Earth's surface from place to another.
3. Effervescence takes place when hydrochloric acid is added to a sample of limestone.
4. Policemen advise drivers using safety belts in cars and planes.

Question 3

A Choose the correct answer :

1. Electromagnet is used in making the .... set.
   a. calculator b. electric bell c. microscope d. night vision
2. All the following are electromagnetic waves except for the ....
   a. thermal rays. b. visible light. c. sound waves. d. ultraviolet rays.
3. Regarding the volume, the Earth occupies the .... order (ascendingly) in the solar system.
   a. fifth b. fourth c. third d. eighth
4. All of the following are metals except ....
   a. iron. b. oxygen. c. copper. d. sodium.

B Mention the main minerals that share in structure of the following rocks :

1. Granite.
2. Limestone.

C Calculate the mass of an object, if its weight is 280 newton, knowing that the Earth's gravitational acceleration is 10 m/sec.

Question 4

A Write the chemical equations representing the following reactions :

1. The reaction between carbon monoxide with oxygen.
2. Hydrochloric acid is combined with ammonia gas.

B Correct the underlined words :

1. Electric generator converts the **heat** energy into electric energy.
2. The water bodies represent about **50 %** of the Earth's surface.
3. **Infrared rays** used in photographic cameras.
4. **Oxides** are substances that dissociate in water producing positive hydrogen ions.

Additional questions

A Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Galaxy	a. measures the distances between stars.
2. Light year	b. is the greatest universe unit.
3. Telescope	c. separates the outer planets from the inner planets.
4. The belt of the wanderer asteroids	d. explores the space.

B Choose the correct answer :

Halley's comet completes its orbit around the Sun each ....

a. 68 years. b. 76 years. c. 76 months. d. 21 years.

25 Luxor Governorate — Educational Directorate

Answer the following questions :

Question 1

A Complete the following statements :

1. Electric motor changes .... energy into .... energy.
2. The bond in (NaCl) molecule is .... bond, while the bond in (N_2) molecule is .... bond.
3. Waves are divide into two types which are .... waves and .... waves.
4. On dissolving in water, acids give .... ions and alkalis give .... ions.
5. Granite belongs to .... rocks, while marble belongs to .... rocks.

B Give one function (importance) for each of the following :

1. The Earth's gravity.
2. Electromagnet.

PART 3

Question 2

A Write the scientific term :

1. It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
2. The chemical compound that is produced from combination of its elements by a constant weight proportions.
3. A sedimentary rock which has the same chemical structure of marble.
4. The change in object's position or direction as the time passes relative to a fixed point.

B Write the chemical formula for the following molecules :

1. Magnesium oxide : ....
2. Copper nitrate : ....
3. Sodium sulphate : ....

C If the Earth's gravitational acceleration in a place is 9.8 m/sec^2. Find the weight of an object its mass is 50 kg .

Question 3

A Choose the correct answer :

1. All of the following are metals except ....
   a. iron. b. oxygen. c. copper. d. sodium.
2. Water covers about .... of the Earth's surface.
   a. 50 % b. 71 % c. 40 % d. 30 %
3. The gases that cause buildings corrosion is/are ....
   a. nitric oxide. b. carbon dioxide. c. sulphur oxides. d. nitrogen oxides.
4. .... waves are an example of mechanical waves.
   a. Water b. Light c. Radio d. Ultraviolet

B Give reasons for :

1. The fan is going to turn after the electric current goes off.
2. The bond in an oxygen molecule is a double covalent bond.

C Knowing that the mass of carbon (C = 12) and oxygen (O = 16) .Find the total masses of reactants and products through the following reaction :

$C + O_2 \longrightarrow CO_2$

Question 4

A Correct the underlined words :

1. Weak nuclear forces are used in **military purposes**.
2. The common name of sodium **hydroxide** is table salt.
3. The outer layer of the Earth is called **the mantle**.
4. The chemical formula of nitric acid is (H_2SO_4).
5. **Gamma ray** is used in photographic cameras.
6. The thickness of the outer core is about **2885 km**.

B Write the chemical equation representing following reactions :

1. Hydrochloric acid is combined with ammonia gas.
2. Reaction of nitrogen monoxide and oxygen.

C What happens when ... ?

1. Absence of ozone layer in atmosphere.
2. The heart muscle contracts and relaxes.

Additional questions

Choose the correct answer :

1. The nearest two planets to the Earth are ....
   a. Mercury and Venus. b. Venus and Mars. c. Mars and Jupiter. d. Mars and Mercury.
2. The nearest planet to the Sun is ....
   a. Earth. b. Mercury. c. Neptune. d. Jupiter.
3. The farthest planet from the Sun in the solar system is ....
   a. Neptune. b. Uranus. c. Mercury d. Venus.

PART 3

Final Examinations

▶ **Final Examinations of Some Governorates.**



Important notes :

- In view of the absence of final examinations for the second term of the academic year 2019 – 2020, therefore the final examinations were put in place for the second term of the previous year.
- Questions signed by "✻" have been added to the final examinations to appropriate the syllabus of the second term of the current academic year 2020 – 2021.

PART 3

1 Cairo Governorate

East Nasr City Educational Directorate

Answer the following questions :

Question 1

A Choose the correct answer :

1. Earth's gravitational acceleration is changed from a place to another on Earth's surface because of ....
   a. object's mass. b. Earth's mass.
   c. the distance from the Earth's centre.
2. Planets revolve around the Sun in .... paths.
   a. circular b. elliptical c. spiral
3. The car brake performance is an application of ....
   a. gravitational forces. b. friction forces. c. centrifugal forces.
4. The chemical formula of sulphuric acid is ....
   a. HNO_3 b. H_2SO_4 c. HCl
5. There is a single covalent bond in .... molecule.
   a. hydrogen b. nitrogen c. oxygen
6. All of the following are periodic motions except the ....
   a. fan. b. pendulum. c. train.
7. * The volcanic flows is known as ....
   a. magma. b. lava. c. core.

B Compare between each of the following :

1. An atom and an ion (The charge).
2. Meteors and meteorites (Definition).
3. Mechanical waves and electromagnetic waves (Example).

C Problem : If the Earth's gravitational acceleration in a place is 9.8 m/s^2, find the weight of 0.5 kg mass ball.

Question 2

A Write the scientific term of each of the following :

1. A system that consists of thousands of millions of stars.
2. A set of atoms joined together behave like one atom only, having a special valency and it can't be existed solely.

3. The motion which is regularly repeated in equal periods of time.
4. Breaking the reactants bonds and forming new ones among the products.
5. The ability of the Earth to attract an object to its centre.
6. Elements have luster, good conductors of heat and electricity, malleable and ductile and they contain 1,2 or 3 electrons in their outer electron shells.
7. The distance covered by light in one year.

B Mention the name of rays (or waves) which are used in each of the following :

1. Cooking food.
2. Examining mineral raws in industry.
3. Sterilizing the sets of surgical operations rooms.

C Identify the type of the following compounds :

1. H_2SO_4 2. MgO 3. NaCl 4. KOH

Question 3

A Put (✓) or (✗) :

1. The Earth's inner core is rich in iron and nickel. ( )
2. By increasing the ratio of CO_2, the air temperature decreases. ( )
3. Liquids transport through pores and the walls of cells from the higher concentration to the lower one. ( )
4. The biggest planet in the solar system is Jupiter. ( )
5. The force is measured in newton. ( )
6. Water covers about 50% of the Earth's surface. ( )
7. The head of the comet is considered icy sphere, while its tail is considered a gaseous cloud. ( )
8. Temperature on the Earth's surface suits the life of living organisms. ( )

B Complete the following equations :

1. $C + O_2 \xrightarrow{\Delta}$ ....
2. $2CO + O_2 \xrightarrow{\Delta}$ ....
3. $2Mg + O_2 \xrightarrow{\Delta}$ ....

C Give reasons for the following :

1. White clouds are formed when ammonia gas reacts with conc. hydrochloric acid.
2. The car passengers are rushed forward when the moving car stops suddenly.
3. The density of the outer planets is low.
4. * Limestone consists of mineral calcite.

PART 3

Question 4

A Complete the following statements :

1. The .... layer in the atmospheric air protects living organisms from harmful rays.
2. Green plants use .... gas in photosynthesis process.
3. The bond in an oxygen molecule is a .... bond, while the bond in a nitrogen molecule is a .... bond.
4. Electric motor works on changing .... energy into .... energy.
5. Acids change the colour of litmus paper into .... , while bases change the colour of litmus paper into ....
6. The nearest planet to the Sun is .... and the farthest one from the Sun is ....

B Mention the harm of :

1. Carbon monoxide.
2. Nitrogen oxides.

C Mention one use of each of the following :

1. Electromagnet.
2. Strong nuclear force.

2 Cairo Governorate

Zeiton Educational Zone
Saint Mary's Integrated Schools

Answer the following questions :

Question 1

A Write the scientific term :

1. A type of nuclear forces used in medicine and scientific researches.
2. It's a layer of molten metals with a thickness 2100 km.
3. The waves which are produced by the vibration of medium particles.
4. Compounds produced as a result of the combination of a positive ion with a negative ion except oxygen.
5. Oxides which help in building corrosion.

B Write the chemical formula of the following :

1. Ferric hydroxide.
2. Aluminium phosphate.
3. Calcium nitrate.

C If the Earth's gravitational acceleration at Earth's surface is 9.8 m/sec^2., and it becomes 9.2 m/sec^2. in a balloon at a height 200 km above the Earth's surface. Calculate the amount of decrease in the weight of a person, its mass 75 kg.

Question 2

A Choose the correct answer :

1. The outer planets consist of some elements such as helium and hydrogen in .... state.
   a. liquid b. gaseous c. molten d. solidified
2. The chemical formula of calcium bicarbonate is ....
   a. CaO b. $CaNO_3$ c. $Ca(HCO_3)_2$ d. $CaCO_3$
3. From forces enable living organisms to do biological operation ....
   a. pulse. b. friction. c. inertia force. d. all the previous.
4. The salt that is formed from combination of positive atomic group with negative atomic group is ....
   a. NH_4Cl b. $(NH_4)_2CO_3$ c. Na_2SO_4 d. NH_4Br
5. The water transports from soil to plants leaves by effect of .... force.
   a. gravity b. biological c. inertia d. friction

B Three elements (X, Y and Z) their atomic numbers respectively (17, 18 and 19) :

a. Which of them, its molecule is formed of 2 atoms.
b. What is the type of bond when element (X) combines with element (Z).
c. Does element (X) combine with element (Y) and why ?

C Correct the underlined words :

1. <u>Gamma rays</u> used in detecting the bone fractures.
2. <u>Comet</u> separates between inner and outer planets.
3. <u>Acids</u> dissolve in water to produce negative hydroxide ion.

Question 3

A Complete the following statements :

1. The outer layer in the Earth is called ...., while the inner layer is called ....
2. Motion is classified into two types, which are .... and ....
3. .... + ... $\xrightarrow{\Delta}$ 2MgO
4. Sound waves are example of .... waves, while light waves are example of .... waves.
5. The biggest planet in volume is .... and the highest one in density is ....
6. * .... and .... are examples of igneous rocks, while .... and .... are examples of sedimentary rocks.

B What will happen if ... ?

1. Putting a wet glass rod with ammonia solution close to the opening of test tube has conc. hydrochloric acid.
2. Ozone layer is destroyed (absent).
3. * The magma comes out of the Earth's surface.

Question 4

A Give reasons for :

1. Ionic bond produces compounds only not elements, but covalent bonds produce both element and compound.
2. The car passengers are rushed forward when the moving car stops suddenly.
3. The density of the outer planets is low.

B Put (✓) or (✗) and correct the wrong ones :

1. The burning of carbon in presence of oxygen is a direct combination reaction. ( )
2. The weight of object decreases with increasing of its mass. ( )
3. Ultraviolet rays are used in examining and curing sets for human body. ( )
4. All nonmetals are solid except mercury. ( )

C Write one use :

1. Infrared rays. 2. Ultraviolet rays. 3. Nitrogen gas. 4. Electromagnet.

3 Cairo Governorate — New Cairo Zone

Answer the following questions :

Question 1

A Complete the following statements :

1. The chemical bond in hydrogen molecule (H_2) is a .... , while the chemical bond in nitrogen molecule (N_2) is ....
2. Transitional motion isn't considered as periodic motion because it has .... and ....
3. The nearest planet to the Sun is ...., while the farthest planet from the Sun is ....
4. Electric generator changes .... energy into .... energy.
5. In the reaction : $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
   a. The bond in oxygen molecule is broken to give ....
   b. The magnesium atom combines with .... atom to form .... molecule.

6. Green plants use .... gas in photosynthesis process.
7. The comet consists of two parts which are .... and ....

B * Put (✓) or (✗), then correct the wrong ones :

1. The coloured marble is free from impurities. ( )
2. Basalt is a volcanic rock. ( )

Question 2

A Write the chemical formula for each of the following :

1. Sodium sulphate.
2. Aluminium oxide.

B If Earth's gravitational acceleration in a place is 9.8 m/s^2, find the weight of the following :

1. 0.3 kg mass ball.
2. 50 kg mass boy.

C Mention one application for each of the following :

1. Ultraviolet rays.
2. Sound waves.

Question 3

A Write the scientific term :

1. A set of atoms joined together, behave like one atom only, having a special valency and can't exist solely.
2. The biggest inner planet.
3. Resistant forces originate between the object in motion and the medium.
4. The motion which is regularly repeated in equal periods of time.
5. The only nonmetal that exists in a liquid state.
6. The force that accompanies the massive amount of energy and it is stored in the nucleus.
7. Compounds produced as a result of the chemical combination of a positive metal ion with a negative atomic group except oxygen.

B Two elements ($_8A$) and ($_{12}B$).

1. Which one is a metal and which one is a nonmetal ?
2. What is the kind of bond formed between them ?

C What happens in each of the following ... ?

1. Wet rod with ammonia gas is put close to conc. HCl
2. Kinetic energy of a dynamo increases.

Question 4

A Give reasons for :

1. CO_2 gas acts as a greenhouse effect.
2. Astronauts can't hear each other directly in space.
3. Earth's inner core is rich in iron and nickel.
4. Car tyres are covered with a very coarse substance.
5. We can obtain sodium chloride solution and not silver chloride solution.

B Choose the correct answer :

1. .... are used in night vision apparatus.
   a. Infrared rays b. Gamma rays c. Ultraviolet rays d. X-rays
2. The distances between stars are measured in .... unit.
   a. metre b. kilometre c. newton d. light year
3. All of the following are considered as periodic motions except the .... motion.
   a. Fan b. Pendulum c. Train d. Sun
4. An object's weight on Earth's surface is related to .... forces.
   a. electromagnetic b. weak nuclear c. gravitational d. strong nuclear

4 Cairo Governorate

Patriarchal College
Abdoon Educational Directorate

Answer the following questions :

Question 1

A Complete the following statements :

1. Sound and light are two forms of .... and they transfer from place to another in the form of ....
2. The acceleration due to gravity is the largest on .... planet, while it is the least on .... planet.
3. Strong nuclear forces are used in producing of .... and in .... purposes.
4. When an element ($_{11}X$) combines with oxygen, the symbol of the produced compound ....
5. From the benefits of friction, it ....
6. On dissolving in water, alkalis give .... ions, while acids give .... ions.
7. .... and .... are salts insoluble in water.
8. * Granite is from .... igneous rocks, while basalt is from .... igneous rocks.

B **Write the chemical formula, the number of atoms and the number of elements of each of the following (in a table) :**

1. Aluminium hydroxide.
2. Calcium nitrate.
3. Copper sulphate.
4. Ammonium carbonate.

C **What are the following numbers indicate :**

1. 22 km.
2. 3.3 to 5.5 gm/cm^3.
3. 7.77 m/sec^2.

Question 2

A **Write the scientific term :**

1. The region which separates between the inner and the outer planets.
2. A set of symbols and chemical formulae representing the reactants and products molecules in the chemical reaction.
3. The property of object resistance to change its state from rest or movement unless force affect on it.
4. Small rocky masses that burn up completely in the Earth's atmosphere.
5. The product of multiplying object's mass by Earth's gravity acceleration.
6. Breaking out the bonds between the molecules of reactants and formation of new bonds between the molecules of products.
7. The motion which is regularly repeated in equal periods of time.

B **Write the chemical equation that represents :**

1. Burning a piece of magnesium ribbon.
2. Reaction of ammonia with conc. hydrochloric acid.
3. Reaction of nitrogen monoxide with oxygen.

C **If you have the following elements : $_{11}A$, $_{17}B$ and $_{10}C$**

1. Which of these elements doesn't combine with the other elements ? (Give a reason)
2. Which elements combine forming ionic bond ?
3. Which of the previous elements can form a covalent bond ?

Question 3

A **Choose the correct answer :**

1. The average distance between the Earth and the Sun = ...
   a. 150×10^6 km. b. 150×10^5 km. c. 150×10^6 m. d. 50×10^6 km.
2. The celestial bodies that consist of head and tail are ....
   a. meteors. b. meteorites. c. comets. d. asteroids.

3. Car brakes are one of the applications of ....
   a. gravitational force. b. nuclear force. c. friction force. d. inertia force.
4. All of the following are monovalent atomic groups except .... group.
   a. nitrate b. bicarbonate c. phosphate d. nitrite
5. The layer which consists of molten metals is ....
   a. crust. b. outer core. c. mantle. d. inner core.
6. The bar used in electromagnet is made of ....
   a. isolated copper. b. steel iron. c. wrought iron. d. aluminium.
7. The Earth takes the .... position according to the size ascendingly.
   a. fifth b. fourth c. third d. second

B Mention one application about the following :

1. X-rays. 2. Gamma rays. 3. Ultraviolet rays. 4. Infrared rays.

C Write the negative effects of the following :

1. Carbon monoxide. 2. Sulphur oxides. 3. Burning cellulose.

Question 4

A Give reasons for :

1. The Earth's inner core is rich in iron and nickel.
2. Steadfastness of the hydrosphere on the Earth's surface.
3. We see lightning before hearing thunder.
4. The bond in water molecule is a single covalent bond.
5. * Volcanic rocks contain small circular holes.

B Put (✓) or (✗), then correct the worng ones :

1. Both mercury and bromine exist in liquid state. ( )
2. Mantle layer lies beneath the Earth's outer core. ( )
3. Green plants use carbon dioxide gas in making protein. ( )
4. Electric generator converts heat energy into electric one. ( )
5. Sodium hydroxide changes the colour of litmus paper into red. ( )
6. Halley's comet revolves around the Sun in more elongated orbit every 80 years. ( )

C What will happen when ... ?

1. The car stops suddenly.
2. When an electric current passes through an insulated copper wire coiling around a bar of soft iron.
3. Burn a piece of magnesium ribbon.
4. Machines are not lubricated.

5 Cairo Governorate

Basatoon & Dar Al Salam Educational Administration

Answer the following questions :

Question 1

A Complete the following statements :

1. The bond in magnesium oxide molecule is ...., whereas the bond in water molecule is ....
2. The types of telescopes are .... and ....
3. The car passengers are rushed .... when the car stops suddenly by the effect of .... force.
4. Egypt seeks to use .... energy in producing electricity.
5. .... force prevents feet from slipping on road, while .... force helps in keeping the atmosphere around Earth.
6. The object's weight increases as the distance from Earth's centre ....

B Put (✓) or (✗) and correct the wrong ones :

1. The motion of simple pendulum is a transitional motion. ( )
2. Lead sulphate salt dissolves in water. ( )

C Calculate the masses of reactants and products in the following reaction :

Knowing that the mass of (H = 1, O = 16, Na = 23)

$2Na + 2H_2O \longrightarrow 2NaOH + H_2$

Question 2

A Choose the correct answer :

1. Which of the following is considered as a circular motion ....
   a. fan motion. b. pendulum motion. c. train motion. d. sunflower motion.
2. The valency of argon is ....
   a. zero. b. monovalent. c. divalent. d. trivalent.
3. Planets revolve around the Sun in .... paths.
   a. circular b. elliptical c. spiral d. irregular
4. The speed of light waves in space is .... speed of radio waves.
   a. less than b. higher than c. equal to d. doubled
5. .... layer is rich in iron and nickel.
   a. Inner core b. Crust c. Outer core d. Mantle

6. * The superficial layer of the Earth's crust is .... layer.

a. thick b. rocky c. loosened d. unfragmented

B Write the chemical formula of the following :

1. Aluminium carbonate.
2. Sulphuric acid.
3. Ferrous oxide.
4. Calcium nitrate.

Question 3

A Write the scientific term :

1. Solidified masses of ice, gases and rock pieces revolving around the Sun.
2. The number of electrons gained, lost or even shared during a chemical reaction.
3. The region which separates the group of the inner planets from the outer planets.
4. Breaking bonds between molecules of reactants and formation of new bonds between molecules of products.
5. It is an effect that attempts to change state of object from static to motion or vice versa.
6. The motion which is regularly repeated in equal periods of time.

B Mention one use of :

1. Ultraviolet rays.
2. Infrared rays.
3. Electromagnet.
4. Weak nuclear force.

C An object of weight 98 N. Calculate its mass knowing that the Earth's gravitational acceleration is 9.8 m/sec^2.

Question 4

A Give reasons for :

1. The sunlight reaches to us but we can't hear the sound of solar explosions.
2. The chemical equation should be balanced.
3. Lubricating and oiling mechanical machines.

B Write one harm for the following :

1. Nitrogen oxides.
2. Carbon monoxide.
3. Burning of coal and cellulose fibers.

C Compare between :

1. Acids and bases.
2. Electric generator and electric motor (concerning the changes of energy).

D Write the balanced chemical equation of the following reactions :

1. Reaction between ammonia and concentrated hydrochloric acid.
2. Reaction between hydrogen and chlorine.
3. Reaction between nitrogen monoxide with oxygen.

6 Cairo Governorate

El-Maadi Educational Administration
Orman Smart School

Answer the following questions :

Question 1

A Complete the following statements :

1. .... and .... are examples of monovalent atomic groups.
2. The Earth's layers from the surface to the centre are Earth's crust, ... , ... and ....
3. Waves are divided into .... and ....
4. Dynamo changes .... energy into .... energy.
5. Oil and lubricants are used in machines to ....

B Calculate the weight of 0.8 kg mass ball, knowing that Earth's gravitational acceleration is 9.8 m/sec^2.

C Write the function of :

1. X-rays. 2. Strong nuclear force. 3. Ultraviolet rays.

Question 2

A Give reasons for :

1. Presence of life on the Earth's surface.
2. Safety belts are used in cars.
3. White clouds are formed when ammonia gas reacts with conc. hydrochloric acid.
4. Steadfastness of hydrosphere on Earth's surface.
5. Noble gases don't participate in any chemical reaction.

B Calculate the mass of reactants and products in the following reaction :

$C + O_2 \xrightarrow{\Delta} CO_2$ (mass of : O = 16 & C = 12).

C Write the chemical formula of :

1. Sodium oxide. 2. Calcium carbonate.

PART 3

Question 3

A Write the scientific term :

1. Compounds dissolve in water producing positive hydrogen ions.
2. The layer of atmosphere which protects us from ultraviolet rays.
3. Type of chemical bonds arises due to electric attraction between positive ion and negative ion.
4. The name of the galaxy that our solar system belongs to it.
5. The number of gained or lost or shared electrons.

B Compare between each of the following :

1. Meteors and meteorites.
2. Inner and outer planets.

Question 4

A Put (✓) or (✗) :

1. Green plants use carbon dioxide gas in photosynthesis process. ( )
2. Sodium hydroxide changes the colour of litmus paper into red. ( )
3. All nonmetals conduct electricity. ( )
4. Dynamo changes heat energy into electric energy. ( )
5. An element, its atomic number is 20, so its valency is monovalent. ( )
6. * Quartz mineral is the main component in granite rock. ( )

B What happens when ... ?

1. Burning of coal and cellulose fibres.
2. The car stops suddenly.

C * What is meant by ... ?

1. Sedimentary rocks.
2. Soil.

7 Giza Governorate

El-Dokki Educational Zone

Answer the following questions :

Question 1

A Complete the following statements :

1. Fundamental forces in nature are divided into three divisions which are .... forces, ... forces and .... forces.
2. The motion of simple pendulum is considered .... motion, while that is produced from throwing a stone in water is considered .... motion and both are considered as forms of .... motion.
3. * Marble is resulted from transformation of ....

B **Compare between :** Electric generator and electric motor.

C **Define :** 1. Force. 2. The ion

Question 2

A **Choose the correct answer :**

1. The telescope is used to study the ....
   a. minerals. b. earthquakes. c. celestial bodies. d. volcanoes.
2. From the examples of forces inside living systems is/are ....
   a. pulse inside blood vessels. b. inertia.
   c. brakes. d. all the previous answers.
3. Regarding the volume, the Earth occupies the .... order (ascendingly) in the solar system.
   a. third b. fourth c. fifth d. eighth
4. The substances resulted from burning of coal and cellulose fibers cause ....
   a. headache. b. fainting. c. lung cancer. d. (a), (b) and (c).
5. There is a triple covalent bond in .... molecule.
   a. hydrogen b. chlorine c. oxygen d. nitrogen

B **Write the electronic configuration of the atoms of the following elements ($_{18}$Ar – $_{12}$Mg – $_{16}$S), then indicate :**

1. The type of each atom (metal – nonmetal – noble).
2. The type of each ion (positive – negative – has no ions).

C **Give reasons for :**

1. The density of the outer planets is low.
2. Potassium ($_{19}$K) is monovalent, while oxygen ($_{8}$O) is divalent.
3. Astronauts can't hear each other voices directly in space.

Question 3

A **Correct the underlined words :**

1. Water molecule consists of **four** atoms for two elements.
2. Strong nuclear forces are used in generating **solar** energy.
3. The Milky Way galaxy takes an oval shape with **straight** arms.
4. Safety belts in cars work on **increasing** the forces of inertia.
5. The water of **oceans** is fresh water.
6. Nitrogen oxides are formed during occurrence of **earthquake**.

B **Calculate the mass of an object, if its weight is 460 newton, knowing that the Earth's gravitational acceleration is 10 m/sec^2.**

C **Write the chemical formula of the following compounds :**

1. Aluminium carbonate.
2. Sodium sulphate.
3. Magnesium hydroxide.
4. Ammonium carbonate.
5. Calcium phosphate.
6. Sulphur trioxide.

Question 4

A **Knowing that the mass of carbon (C = 12) and oxygen (O = 16) find the total masses of reactants and products through the following reaction :** $C + O_2 \xrightarrow{\Delta} CO_2$

B **What happens when ... ?**

1. A wet glass rod with ammonia solution is exposed to a test tube containing concentrated hydrochloric acid.
2. * Decreasing the temperature of lava on the Earth's surface rapidly.

C **Write the scientific term in front of each of the following :**

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
2. Breaking the reactants bonds and forming new ones among the products.
3. The largest planet in the solar system.
4. Compounds that dissolve in water producing positive hydrogen ions H^+.
5. A system that consists of thousands of millions of stars.
6. An atom of an element does not give or gain any electrons.

8 Giza Governorate

Omrania Educational Zone

Answer the following questions :

Question 1

A **Complete the following statements :**

1. Water covers .... from Earth's surface.
2. .... produced from lightning that affect the nervous system and eye.
3. .... is the measuring unit between celestial bodies.
4. .... is from the importance of chemical reactions in daily life.
5. $2Mg + ... \xrightarrow{\Delta} 2MgO$
6. .... layer protects living organisms from harmful rays.
7. Comets are consist of .... and ....

B Correct the underlined words :

1. On burning magnesium strip in air, **a black** powder is formed.
2. The passengers are rushed backward when the car moves suddenly due to **friction** force.
3. **Weak nuclear forces** are used in producing electric energy.
4. The waves that are used in examining and curing sets of human body are **infrared rays**.

C Calculate the weight of an object, if the Earth's gravitational acceleration is 9.8 m/s^2 and its mass is 5 kg.

Question 2

A Write the scientific term :

1. An effect attempts to change the object's phase from being static to motion or change the motion direction.
2. The number of electrons gained, lost or even shared by an atom during chemical reaction.
3. Luminous lines which are formed in the sky due to completely burning of small rocky masses in the Earth's atmosphere.
4. Breaking the reactants bonds and forming new ones among the products.
5. Region that separates between Mars and Jupiter.

B Give reasons for :

1. Lubricating and oiling machines parts.
2. A chemical equation should be balanced.
3. We see lightning before hearing thunder.
4. There is life on Earth planet.

C Mention the importance of :

1. Gamma rays. 2. Infrared rays. 3. Chemical reaction.

Question 3

A Choose the correct answer :

1. The car brakes performance is an application of ....
   a. attraction force. b. friction force. c. force of inertia.
2. Earth's inner core is rich in ....
   a. copper and iron. b. iron and silver. c. iron and nickel.
3. Electromagnet is used in making ....
   a. electric winch. b. calculator. c. microscope.
4. Planets revolve around the Sun in .... paths.
   a. circular b. spiral c. elliptical

5. .... is/are from forces inside living organisms.
   a. Contraction and relaxation of muscles
   b. Electromagnetic force
   c. Attraction force
6. All of the following are periodic motions except ....
   a. movement of the Moon around the Earth.
   b. train motion.
   c. pendulum motion.
7. * Limestone has a ....
   a. white colour with coarse texture.
   b. yellow colour with coarse texture.
   c. yellow colour with smooth texture.
   d. white colour with smooth texture.

B Mention the difference between :

1. Acids and bases.
2. Electric generator and electric motor.
3. Outer planets and inner planets in solar system.

C Write the chemical formula of :

1. Sulphuric acid.
2. Aluminium oxide.

Question 4

A What will happen when ... ?

1. Approaching a wet rod with hydrochloric acid to ammonia gas.
2. The increase of the percentage of carbon dioxide in the atmospheric air.
3. An electric current passes through an insulated copper wire coiling around a bar of iron.

B Give an example of :

1. Noble gas.
2. Monovalent atomic group.
3. Circular motion.

C Find the masses of reactants and products in the reaction :

$C + O_2 \xrightarrow{\Delta} CO_2$ [Knowing that (C = 12 and O = 16)]

9 Giza Governorate

El-Haram Directorate
Hafr Elbaten School

Answer the following questions :

Question 1

A Write the scientific term :

1. Small rocky masses that burn up completely due to friction with Earth's atmosphere.
2. The effect that attempts to change the object's phase from being static to motion.
3. The device that changes electric energy into mechanical energy.

4. A movement which is regularly repeated in equal intervals of time.
5. A bond resulting from the participation of each of the two atoms with three electrons.
6. Changing an object's position as time passes from its initial position to final one.
7. Elements that don't participate in chemical reaction under the ordinary conditions due to the completeness of their outermost energy levels.

B Calculate the total mass of reactants and products in the following reaction :

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$ (Knowing that the mass of Mg = 24 & O = 16).

C Choose the odd word out, then mention what the rest has in common :

1. Light waves – Sound waves – Water waves.
2. Oxygen – Nitrogen – Chlorine – Sodium.
3. Earth'crust – Atmosphere – Mantle – Core.

Question 2

A Choose the correct answer :

1. The solid layer in the Earth that is rich in iron and nickel is ....
 a. crust. b. mantle. c. outer core. d. inner core.
2. Electromagnet is used in making ....
 a. calculator. b. electric bell.
 c. microscope. d. night vision apparatus.
3. The chemical formula of hydrochloric acid is ....
 a. H_2O b. HCl c. H_2SO_4 d. HNO_3
4. The object's weight on Earth's surface is related to ....
 a. electromagnetic force. b. gravitational force.
 c. nuclear force. d. friction force.
5. From circular motion is ....
 a. pendulum motion. b. movement of Moon around Earth.
 c. water wave motion. d. bicycle motion.
6. All of the following forces and operations are applications on friction except ....
 a. walking on ground. b. moving cars.
 c. the work of dynamo. d. stopping cars.
7. .... oxides are resulted during lightning.
 a. Carbon b. Sulphur c. Nitrogen d. Hydrogen

B An object whose mass is 10 kg, calculate its weight knowing that the Earth's gravitational acceleration is 9.8 m/s².

PART 3

C Write the chemical formula of the following compounds :

1. Silver chloride.
2. Sulphur trioxide.
3. Sodium sulphate.
4. Aluminium oxide.
5. Nitric acid.

Question 3

A Complete the following statements :

1. .... and .... are accompanied forces to motion.
2. The bond in sodium chloride is .... bond, whereas the bond in water molecule is .... bond.
3. The valency of phosphate group is ....
4. The motion of simple pendulum is .... motion, while the motion of train is .... motion.
5. * The plant roots extend easily through the upper part of the .... layer.

B Mention the importance of the following :

1. Ozone layer.
2. Ultraviolet rays.
3. Strong nuclear force.

C What happens in the following cases ... ?

1. A moving car stops suddenly.
2. There is no atmosphere around the Earth.
3. Adding ammonia to concentrated hydrochloric acid.
4. Burning of coal and cellulose fibres (concerning its effect on air).

Question 4

A Show by a chemical equation the following reactions :

1. Reaction between ammonia gas and hydrochloric acid.
2. Reaction of carbon monoxide with oxygen.
3. Burning a piece of carbon in the presence of oxygen.

B Mention one harm for the following :

1. Carbon dioxide.
2. Nitrogen oxides.
3. Friction force.

C Put (✓) or (✗) :

1. Earth's radius between the two poles is larger than that at the equator. ( )
2. A chemical equation should be balanced to achieve the law of conservation of matter. ( )
3. Weak nuclear forces are used in producing electric energy. ( )
4. Crust is the outer layer of Earth. ( )

D Give reasons for :

1. An object's weight is changed from a planet to another.
2. The density of inner planets is high, while that of outer planets is low.
3. We see lightning before hearing thunder.
4. The planet Earth is suitable for life.
5. * The cohesion of layers of sedimentary rocks increases by passing time.

10 Giza Governorate

Sheikh Zayed Educational Directorate
Modern Infinity Language School

Answer the following questions :

Question 1

A Write down the scientific term for each of the following :

1. Luminous lines which are formed in the sky due to completely burning of small rocky masses in the Earth's atmosphere.
2. Resistant forces originated between the object in motion and the medium touching it.
3. Rays used in detecting the bone fractures.
4. A system that consists of thousands of millions of stars.

B complete the following :

1. Electric motor changes .... energy into .... energy.
2. NH_3 + ... $\xrightarrow{\text{Conc.}}$ NH_4Cl, the type of this reaction is ....
3. The bond in oxygen molecule is .... bond, while that in calcium oxide is .... bond.
4. Asteroid belt lies between the oribts of .... and ....
5. .... is an example for acids, while .... is an example for bases.
6. * Plutonic rocks have crystals with .... size, while volcanic rocks have crystals with .... size.

Question 2

A Choose the correct answer :

1. The magnesium ribbon changes into white powder of .... when it burns in air.
   a. magnesium nitrite b. magnesium oxide
   c. magnesium hydroxide d. magnesium dioxide
2. All of the following are periodic motions except the .... motion.
   a. fan b. pendulum c. train d. sunflower

PART 3

3. Ammonia combines with HCl producing .... of ammonium chloride.

a. white powder b. white ppt. c. white fumes d. white solution

4. The isolated coil in electromagnet made up of ....

a. iron. b. magnet. c. copper. d. mercury.

5. .... rays are used in remote sensing instruments.

a. Ultraviolet b. Infrared c. Gamma d. Visible light

6. The distance covered by light in one year = ... km.

a. 150 million b. 6368 c. 5.9×10^{24} d. 9.467×10^{12}

7. .... is a liquid metal.

a. Mercury b. Nitrogen c. Magnesium d. Chlorine

8. The chemical formula of carbonate group is ....

a. $(CO_3)^{-2}$ b. CO c. $(HCO_3)^-$ d. CO_2

9. .... salt dissolves in water.

a. K_2SO_4 b. $CuCO_3$ c. $PbSO_4$ d. $CaCO_3$

10. Earth is the .... planet regarding to the volume (ascendingly).

a. 1st b. 2nd c. 3rd d. 4th

B Give reasons for the following :

1. We must use safety belts during driving.
2. We see lightning before hearing thunder.
3. The bond in sodium chloride is ionic bond.
4. When an atom gains an electron or more, it becomes a negative ion.

Question 3

A Match :

(A)	(B)
1. The chemical formula of sodium sulphate	a. electromagnetic wave.
2. Sound	b. NaCl
3. Light	c. Na_2SO_4
4. $_{12}Mg$	d. metal.
5. $_{17}Cl$	e. nonmetal.
6. The chemical formula of sodium chloride.	f. mechanical wave.

B Write the electronic configuration for the following elements and determine the type of the ion formed [negative – positive – no ion] : $_{18}Ar$ – $_{8}O$ – $_{20}Ca$ – $_{2}He$

C Compare between :

1. The inner and outer planets.
2. Acids and bases.

Question 4

A put (✓) or (✗) and correct the wrong ones :

1. Bromine is a liquid nonmetal. ( )
2. Base is a substance dissolves in water giving $(OH)^-$ ( )
3. The motion of simple pendulum is a transitional motion. ( )
4. The sound and water waves are examples of electromagnetic waves. ( )
5. The number of known elements is 118 ( )
6. In the positive ions, the number of electrons is more than the number of protons. ( )
7. Argon is considered as a noble gas. ( )
8. The percentage of salty water in the Earth is 3% ( )
9. The planets revolve around the Sun in a circular way. ( )
10. The biggest acceleration is on Jupiter planet. ( )

B Write one use or benefit :

1. Infrared rays.
2. Gamma rays.
3. Electromagnet.
4. Friction force.

C * What are the results based on ... ?

You add hydrochloric acid to limestone.

11 Alexandria Governorate

El-Montazah Directorate
Brilliance Language School

Answer the following questions :

Question 1

A Choose the correct answer :

1. The measuring unit of the speed is ....
   a. m/sec. b. joule. c. kg. d. newton.
2. The Earth is located in the solar system regarding its distance from the Sun in the .... order.
   a. fifth b. fourth c. third d. seventh
3. If ($_{13}Al$) combines with ($_{8}O$), the chemical formula of the formed compound is ....
   a. Al_3O_2 b. AlO c. AlO_2 d. Al_2O_3

4. If the weight of a body is 400 N, knowing that the Earth's gravitational acceleration is 10 m/sec.^{2}, its mass equals ....

a. 40 kg. b. 4 kg. c. 4000 kg. d. 80 kg.

5. The type of bond in nitrogen molecule is .... bond.

a. double covalent b. single covalent c. triple covalent d. ionic

6. All of nonmetals don't conduct electricity except ....

a. bromine. b. aluminium. c. graphite. d. mercury.

B Write the electronic configuration of each of the following atoms :

$_{8}O$ – $_{11}Na$ – $_{17}Cl$ – $_{18}Ar$

Then indicate :

(1) The type of each element (metal – nonmetal – inert gas).

(2) The type of bond formed between:

a. Two oxygen atoms. b. Sodium and chlorine atoms.

C What happens when ... ?

1. Meteors enter the atmosphere.
2. A wet glass rod with ammonia solution is exposed to a test tube containing concentrated hydrochloric acid. (mention the chemical equation).

Question 2

A Mention one importance of :

1. Gamma rays. 2. Safety belts. 3. Electromagnet.

B Write the scientific term :

1. The motion of an object in which its position is changed relative to a fixed point from initial position to final position.
2. The most famous comet.
3. The gas that causes a greenhouse effect.
4. Forces produced inside the nucleus.
5. * A molten material, that exists at depths beneath the crust.

C What are the results of ... ?

1. Burning of coal and cellulose fibres.
2. Putting a red litmus paper in a test tube contains sodium hydroxide and another one in hydrochloric acid.

Question 3

A Give reasons for :

1. The valency of noble gases is zero.
2. Lubricating and oiling mechanical machines.
3. Earth planet is suitable for life. (mention at least 3 reasons).
4. Object's weight changes from one place to another on the Earth's surface.
5. * The components of basalt rock cannot be seen by the naked eye.

B Give one example for each of the following :

1. Metal has more than one valency.
2. Salt dissolves in water.
3. Benefits of friction.
4. Positive monovalent atomic group.

C Write the chemical formula for each one :

1. Ammonium sulphate.
2. Calcium chloride.
3. Ferric oxide.
4. Silver nitrate.

D If you have an element : ($^{40}_{20}X$)

1. Mention its kind.
2. Its valency.

Question 4

A Knowing that the mass of carbon = 12 and oxygen = 16, find the total mass of reactants and products of the following reaction : $C + O_2 \xrightarrow{\Delta} CO_2$

B Compare between :

1. Metal oxides and nonmetal oxides (according to: definition – example).
2. Electromagnetic and mechanical waves (according to: definition – example).

C Complete the following statements :

1. The motion of the simple pendulum is .... motion, while the motion of the train is .... motion.
2. Nitrogen oxide affects .... system and the ....
3. The Earth's inner core is rich in .... and ....
4. The electric motor changes .... energy into .... energy.
5. Green plants use .... gas in photosynthesis process and use .... gas to form proteins.
6. $2CO + O_2 \xrightarrow{\Delta}$ ....

D Mention the type of the following compounds : (Acid – Oxide – Base – Salt).

1. CaO
2. Na_2SO_4
3. KOH
4. HNO_3

PART 3

12 Alexandria Governorate

El-Gomrok Zone

Answer the following questions :

Question 1

A Complete the following statements :

1. .... gas enters in formation of proteins and it represent .... of the air volume.
2. .... layer protects living organisms from harmful .... rays.
3. $H_2 + Cl_2 \longrightarrow$ ....
4. Electromagnet is used to make .... and ....
5. The chemical equation should be .... to achieve the law of conservation of mass.
6. * .... is a thin .... layer, which covers the Earth's crust.
7. * Rocks are classified according to the way of formation into .... , ... and .... rocks.

B Mention :

1. Two benefits of friction.
2. One use of gamma rays.
3. The bad effect of carbon dioxide.
4. An example of a circular motion.

C Knowing that the mass of carbon C is 12 and oxygen O is 16 : find the total mass of reactants and products through the following reaction. $C + O_2 \xrightarrow{\Delta} CO_2$

Question 2

A Write the scientific term :

1. Used to change the mechanical energy into electric energy.
2. Breaking the reactants bonds and forming new ones among the products.
3. Oxides that cause building corrosion.
4. Waves that don't need a medium to propagate.
5. Any body swims in the space such as stars and planets.
6. A set of atoms behaving like one atom during the reaction.

B Compare between : (one point only)

1. Mechanical and electromagnetic waves.
2. Sodium chloride (NaCl) and sliver chloride (AgCl).

C Identify the type of the following compounds :

1. KOH 2. MgO 3. HNO_3 4. Na_2SO_4

Question 3

A Correct the underlined words :

1. Friction causes a great loss of **chemical** energy.
2. The chemical formula of copper carbonate is **CuCO**
3. The Earth occupies the **fifth** position according to its distance from the Sun.
4. The bond in oxygen molecule is a **triple** covalent bond.
5. The motion of simple pendulum is an example of **wave** motion.
6. **Nitrogen oxides** cause headache and stomach-aches.

B Give reasons for :

1. Infrared rays are used in cooking. 2. Acids turn the colour of litmus paper to red.

C Write the chemical formula of each of the following :

Zinc oxide – Ammonium carbonate – Aluminium carbonate – Silver nitrate.

Question 4

A What is meant by ... ?

1. Inertia. 2. Valency.

B Choose the odd word out :

1. Sodium – Oxygen – Chlorine – Nitrogen.
2. NaCl – $MgCl_2$ – HCl – Na_2SO_4
3. Gravitational force – Friction force – Nuclear force.
4. Mercury – Venus – Jupiter – Mars.

C Show by drawing the combination between :

1. ($_1$H) and ($_1$H) to form hydrogen molecule.
2. ($_1$H) and ($_8$O) to form water molecule.

13 Alexandria Governorate

El-Agamy Educational Zone

Answer the following questions :

Question 1

A Complete the following statements :

1. The type of chemical bond in magnesium oxide is ...., while in water molecule is ....
2. The chemical equation should be .... to achieve law of conservation of ....
3. The nearest planet to the Sun is .... and the farthest planet from the Sun is ....
4. White .... are formed on adding ammonia to concentrated ....

B Mention one function for each of the following :

1. X-rays.
2. Weak nuclear force.
3. Electromagnet.
4. Ozone layer.

C Correct the underlined words :

1. The atmospheric pressure is about **90 cm.Hg**.
2. Nitrogen oxides are formed during occurrence of **earthquakes**.

Question 2

A Write the scientific term :

1. A force by which objects are attracted to the Earth.
2. The distance covered by light in one year.
3. They are compounds resulted from the combination between oxygen and an element.
4. Substances dissociate in water and give negative hydroxide ions.

B Show by chemical equation :

1. Burning of coal in air.
2. Reaction between carbon monoxide and oxygen.

C Compare between : Inner and outer planets (2 points).

D Write the chemical formula of each of the following :

1. Calcium carbonate.
2. Aluminium oxide.

Question 3

A Give reasons for :

1. Earth is suitable planet for life.
2. We see lightning before hearing the thunder.
3. Sodium is monovalent element.
4. Planets revolve around the Sun in fixed orbits.

B Give one example :

1. Insoluble salt in water. 2. Transitional motion. 3. Rays have heat effect.

C Define :

1. Chemical formula. 2. Inertia.

Question 4

A Choose the correct answer :

1. Sodium chloride molecule is considered ....
   a. an acid. b. an alkali. c. an oxide. d. a salt.
2. The symbol of phosphate group is ....
   a. $(CO_3)^{-2}$ b. $(PO_4)^{-3}$ c. $(SO_4)^{-2}$ d. $(NH_4)^{+}$
3. Lubricating and oiling mechanical machines depend on decreasing the effect of .... force.
   a. inertia b. friction c. attraction d. electromagnetic
4. .... changes the mechanical energy into electric energy.
   a. Dynamo b. Electromagnet c. Motor d. Electric fan
5. The greatest Earth's layer in thickness is the ....
   a. Earth's crust. b. inner core. c. outer core. d. mantle.
6. The biggest units of universe are ....
   a. galaxies. b. planets. c. stars. d. moons.
7. * All of the following are minerals, that form granite rock except ....
   a. quartz. b. olivine. c. mica. d. feldspar.

B What happens when ... ?

1. Putting litmus paper in a beaker contains HCl.
2. There is no friction force (2 points).
3. An atom loses one electron or more.

C An object of mass 100 kg on Earth, calculate its weight knowing that the Earth's gravitational acceleration is $9.8\ m/sec^2$.

14 Al-Qaliubya Governorate

Al Resala Language School
Al Obour Educational Directorate

Answer the following questions :

Question 1

A Complete the following statements :

1. The valency of $_{18}Ar$ is ...., while that of $(CO_3)^{-2}$ is ....
2. $C + O_2 \xrightarrow{\Delta}$ ....
3. According to the law of conservation of mass, the sum of .... masses equals the sum of .... masses.
4. The bond in sodium chloride is ...., whereas the bond in oxygen molecule is ....
5. ....and .... are from the examples of transitional motion.
6. The electromagnet changes .... energy into .... energy.
7. Earth consists of a number of arranged layers from the surface to the centre, as follows the crust, ... and ....
8. On dissolving acids in water, they give .... ions, while on dissolving .... in water, they give negative hydroxide ions $(OH)^-$.

B Write the chemical formula for the following :

1. Sulphuric acid.
2. Calcium hydroxide.
3. Sodium bicarbonate.
4. Aluminium hydroxide.

C Compare between :

1. Acids and bases (One point only for each).
2. Electromagnetic waves and mechanical waves (Concerning: speed).
3. Hg and Br (According to: the type of element and its physical state).
4. Light and sound waves (One point only for each).

Question 2

A Write the scientific term :

1. A bond resulting from the participation of each of the two atoms with two electrons.
2. They are waves that produced due to the vibration of the medium particles and they need a medium to transfer through.

3. The layer that protects living organisms from harmful UV.
4. A type of nuclear forces that are used in medicine and scientific researches.
5. The first outer light layer that its thickness is ranging between 8-60 km.
6. The number of electrons that an atom gains, loses or even shares during the chemical reaction.

B **Mention an example for :**

1. A nonmetal liquid element.
2. A salt dissolves in water.
3. An electromagnetic wave.
4. A monovalent atomic group.

C **Put (✓) or (✗), then correct the wrong ones :**

1. Green plants use O_2 gas in photosynthesis process. ( )
2. Silver chloride changes the colour of litmus paper into red. ( )
3. The idea of machine oiling and lubrication depends on the increasing of friction force. ( )
4. Our solar system belongs to the milky way galaxy. ( )

D **Write the name of the following compounds :**

1. KOH 2. CO_2 3. Na_2O 4. HCl

Question 3

A **Choose the correct answer :**

1. All nonmetals don't conduct electricity except ....
   a. bromine. b. graphite. c. sulphur. d. phosphorus.
2. The layer which consists of molten metals is the ....
   a. crust. b. mantle. c. outer core. d. inner core.
3. During chemical reactions, ($_{19}K$) atom loses electron(s) and changes into ....
   a. K^+ b. K^- c. K^{+2} d. K^{-2}
4. .... is a mechanical wave.
   a. X-ray b. Light c. Sound d. Gamma ray
5. The valency of helium ($_2He$) is ....
   a. zero. b. one. c. two. d. four.
6. All of the following substances turn the litmus paper into blue except ....
   a. H_2SO_4 b. $Ca(OH)_2$
   c. KOH d. no correct answer.

B **Give reasons for :**

1. Jupiter, Saturn, Uranus and Neptune are called the outer giant planets.
2. We receive the sunlight but we don't hear the sound of the solar explosions.

3. All acids turn the litmus paper into red.
4. $_{13}Al$ tends to form a positive ion, while $_{17}Cl$ tends to form a negative ion.

C Problems :
(Knowing that the mass of : H= 1, Cl= 35.5, S= 32, O= 16).

1. Calculate the masses of reactants and products in the following equations :
   a. $H_2 + Cl_2 \longrightarrow 2HCl$
   b. $S + O_2 \xrightarrow{\Delta} SO_2$
2. Calculate the weight of an object, its mass is 700 kg. (Knowing that the Earth's gravitational acceleration is 9.8 m/sec^2).

Question 4

A Correct the following statements :

1. The mass of an object is changed from one place to another.
2. Sodium chloride is considered an oxide.
3. Elements having 1,2 or 3 electrons in their outermost energy levels are nonmetals that don't share in the chemical reaction.
4. Meteoroids are celestial bodies that burn up completely when penetrate the atmosphere and they are big rocky masses.
5. Land percentage on the Earth's surface forms about 50%
6. Safty belt is an application on friction force.
7. * When hydrochloric acid is added to limestone, oxygen gas is evolved.

B Mention an application / importance for each of the following :

1. X-rays. 2. Friction force. 3. IR rays. 4. Sound waves.

C Write the chemical equation for the following reactions :

1. The burning of magnesium ribbon in the air.
2. The combination of ammonia gas with conc. hydrochloric acid.

D What happens in the following cases ... ?

1. An atom loses one electron or more.
2. A moving car stops suddenly. (Mention the reason).
3. Migration of a bird from the south pole to the equator. (Related to: the mass and the weight of the bird).
4. * Increasing the pressure on the grains of rocks forming the layers of sedimentary rocks.

15 El-Sharkia Governorate

Abo-Salem Official Language School

Answer the following questions :

Question 1

A Complete the following statements :

1. On dissolving acids in water give .... ions, while alkalis give .... ions.
2. .... oxides affect the nervous system, while .... oxides cause respiratory system malfunction.
3. Heart muscle .... and .... helps the heart to pump blood to all over the body.
4. .... rays are used in night vision apparatus.
5. The density of the outer planets is .... than the density of inner planets.
6. * .... is a sedimentary rock.

B What is meant by ... ?

1. Chemical equation.
2. Friction forces.

C Mention one function (use) of each of the following :

1. Ultraviolet rays.
2. Strong nuclear force.
3. Telescopes.

Question 2

A Write the scientific term of each of the following :

1. An object's position changes as time passes from its initial position to a different final one.
2. Small space bodies that are affected by the planets' gravity.
3. White clouds are formed on placing a wet rod with conc. hydrochloric acid close to a test tube containing ammonia solution.
4. A bond resulting from the participation of each of the two atoms with three electrons.

B Write the chemical formula of the following and determine the number of atoms and the number of elements.

1. Sodium sulphate.
2. Aluminium carbonate.
3. Ammonium nitrate.

C What happens when ... ?

1. Two objects move at the same speed and in the same direction.
2. Absence of ozone layer in the atmosphere.

PART 3

Question 3

A Choose the correct answer :

1. Element (M) form a compound $M(OH)_3$ so, its valency is ....
   a. monovalent. b. divalent. c. trivalent. d. tetravalent.
2. .... are used in examining bones.
   a. Ultrasonic waves b. Gamma rays c. Infrared rays d. X-rays
3. The layer which consists of molten metals is the ....
   a. crust. b. mantle. c. outer core. d. inner core.
4. All of the following are covalent molecules except ....
   a. H_2O b. MgO c. N_2 d. O_2

B From the opposite reaction : $2CO + O_2 \xrightarrow{\Delta} 2CO_2$

Show how the conservation law of matter is achieved, then define it.

(knowing the atomic masses of : C = 12 & O = 16)

C Write the characteristics of the Earth that support the continuity of life.

Question 4

A Give reasons for the following :

1. Car tyres are covered with a very coarse substance.
2. Object's weight changes from one place to another on the Earth's surface.
3. Ionic bonds produce compounds only not elements.
4. * Some kinds of marble are coloured and others are white.

B Cross the odd word out :

1. H_2O – HBr – HCl – HNO_3
2. Radio waves – Microwaves – Sound waves – X-rays.
3. Earth – Venus – Neptune – Halley.

C Answer the following questions :

1. Calculate the distance in light year between two stars, if the distance between them equals 28.401×10^{12} km.
2. Element (X) combines with oxygen forming (X_2O) oxide :
   a. Mention the valency of element (X).
   b. What is the type of the produced oxide.

16 El-Menofia Governorate
Shebin El-Kom Directorate

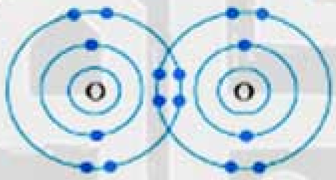
Answer the following questions :

Question 1

A Complete the following statements :

1. The chemical formula of water is .... , while the chemical formula of table salt is ....
2. Sound waves are example of .... waves but radio waves are example of .... waves.
3. The distance covered by the light in one year is called ....which measure the distance between ....
4. An object's .... changes from a place to another on the Earth's surface, whereas its .... remains fixed.
5. $NH_3 + HCl \xrightarrow{conc.}$ .... 6. $2Mg + O_2 \xrightarrow{\Delta}$ ....

B Complete the following figure and write the kind of the bond : ($^{16}_{8}O$):

.... + ... ⟶ 

Oxygen molecule (O_2)

Question 2

A Write the scientific term for each of the following :

1. Substances dissociate in water producing positive hydrogen ions (H^+)
2. Motion which is regularly repeated in equal periods of time.
3. Small space bodies that are affected by the planets' gravity.
4. An atom of an element that doesn't lose or gain any electrons in ordinary conditions.
5. * Rocks that are formed when old rocks (igneous or sedimentary) are subjected to pressure and high temperature.

B Write the chemical formula for each of the following :

1. Calcium nitrate. 2. Copper sulphate.

C Mention one benefit for :

1. Friction. 2. Ozone layer.

PART 3

Question 3

A Choose the correct answer :

1. All of these salts dissolve in water except ....
   a. sodium chloride. b. potassium sulphate. c. silver chloride.
2. The mass of an object, its weight is 98 newton is ....
   (knowing that the Earth's gravitational acceleration = $9.8\ m/s^2$)
   a. 10 kg. b. 980 kg. c. 0.98 kg.
3. Planets revolve around the Sun in .... paths.
   a. circular b. elliptical c. spiral

B Give reasons for :

1. A chemical equation should be balanced.
2. Earth's inner core is rich in iron and nickel.
3. Infrared rays are used in cooking food.
4. The presence of white colour surrounds the planet Earth.
5. * Effervescence takes place when hydrochloric acid is added to a sample of limestone.

Question 4

A Put (✓) or (✗) :

1. Some elements have more than one valency such as iron (Fe). ( )
2. Sodium hydroxide changes the colour of litmus paper into red. ( )
3. Liquids transport through pores and the walls of cells from the higher concentration to the lower one. ( )
4. Earth's radius between the two poles is larger than that at the equator. ( )
5. The football player is rushed forward and falls down if he is tripped during running. ( )
6. Asteroids' belt is located between the orbits of Earth and Mars. ( )
7. The exerted work to lift an object increases by increasing the object's mass. ( )
8. The density of outer planets is lower than the density of inner planets. ( )

B Give one example for :

1. An apparatus depends in its working on electromagnetic forces.
2. Acidic gases cause respiratory system malfunctions and building corrosion.
3. The comets.

17 El-Gharbia Governorate

Samanoud Educational Zone

Answer the following questions :

Question 1

A Complete the following statements :

1. Increasing the ratio of .... gas in air leads to increasing the air temperature.
2. The work done to lift an object increases by .... its mass.
3. .... is the smallest Earth's layer in thickness.
4. .... elements do not participate in chemical reactions in ordinary conditions and their valency is ....
5. The greatest units that form the universe are called ....

B Mention only one application for each of the following :

1. Gamma rays.
2. Ultraviolet rays.

C Write the chemical formula of the following compounds, then mention their types :

1. Magnesium phosphate.
2. Ferric hydroxide.
3. Hydrogen chloride.

Question 2

A Write the scientific term :

1. Solidified masses of gases, ice and rock pieces revolve around the Sun in elliptical orbits.
2. Breaking down the bonds between atoms of reactant molecules and formation of new bonds.
3. The motion which is repeated regularly in equal intervals of time.
4. The effective point of an object's weight.

B What would happen in each of the following cases ... ?

1. A bird migrates from the north pole to the equator (concerning its mass and weight).
2. Small rocks penetrate the Earth's atmosphere.
3. Approaching a wet rod with hydrochloric acid to a test tube containing ammonia solution.
4. * Decreasing the temperature of lava on the Earth's surface rapidly.

C Choose the odd word out, then mention the link between the rest :

1. Nitrogen molecule – Table salt molecule – Water molecule – Oxygen molecule.
2. Mars – Saturn – Venus – Mercury.

PART 3

Question 3

A Choose the correct answer :

1. Water transports from soil to leaves of plants by the effect of .... force.
   a. gravitational b. biological
   c. electromagnetic d. inertia
2. All the following characteristics support the continuity of life on the Earth except ....
   a. atmosphere. b. attraction force. c. electromagnetic force. d. temperature.
3. The electronic configuration of potassium ($_{19}K$) ion is similar to the electronic configuration of .... ion.
   a. $_{8}O$ b. $_{11}Na$ c. $_{18}Ar$ d. $_{17}Cl$
4. When a car is at a rest starts moving suddenly, the passengers ....
   a. rush backward. b. turn upside down. c. rush forward. d. keep steady.
5. * Sedimentary rocks form a thin cover that wraps about .... of the surface of the Eath's solid mass.
   a. 5% b. 75% c. 71% d. 57%

B Give reasons for each of the following :

1. We see lightning before hearing thunder.
2. Nitrogen gas is an important component in Earth's atmosphere.
3. We can obtain sodium chloride solution and not silver chloride solution.

C Compare between :

1. Electric generator and electric motor.
2. Inner core and outer core of the Earth.

Question 4

A Correct the underlined words :

1. Negative ions have number of energy levels **less than** that in their atoms.
2. Completing the food digestion and absorption processes is one of the importance of the Earth's **atmospheric pressure**.
3. The change of an object's position as time passes according to a frame of reference is called **average motion**.

B What is meant by each of the following ... ?

1. The distance between two stars is 2 light years.
2. The weight of an object is 30 newton.

C **Study the following chemical reaction, then answer the questions :**

Sodium hydroxide + Nitric acid ⟶ Sodium nitrate + Water

1. Write the balanced symbolic equation that represents this chemical reaction.
2. Show how the conservation law of matter is achieved in this reaction.
   (knowing that the masses of elements are : (H=1 , O=16 , Na=23 & N=14))

18 Dakahlia Governorate

Belkas Educational Zone

Answer the following questions :

Question 1

A **Write the scientific term :**

1. The ability of the Earth to attract an object to its centre.
2. Waves which need a medium to transfer through.
3. The greatest units which form the universe.
4. Small space bodies that are affected by the planets' gravity.
5. A bond resulting from the participation of each of the two atoms with three electrons.
6. Compounds are dissociated in water producing $(OH)^-$ ions.

B **Calculate the mass of an object, if its weight is 285 newton and the Earth's gravitational acceleration is 10 m/sec^2.**

C **Complete the following table :**

Name of the compound	Chemical formula	Number of atoms in the molecule	Number of elements in the molecule
Sulphuric acid	...... (1)	...... (2)	...... (3) ......
...... (4)	$CuCO_3$	...... (5)	...... (6) ......

Question 2

A **Correct the underlined words :**

1. On burning magnesium strip in the presence of oxygen gas, **blue** powder is formed.
2. The **middle layer** of the Earth is rich in nickel and iron.
3. The motion of simple pendulum is **circular** motion.
4. Egypt seeks to use nuclear energy in producing **medicine**.
5. **Ultraviolet rays** are used in photographing bones to detect the sites of bones fractures.
6. The bond in magnesium oxide is **single covalent** bond.

PART 3

B Give reasons for :

1. Sodium $_{11}Na$ is monovalent, while $_8O$ is divalent.
2. Car tyres are covered with a very coarse substance.
3. We receive the sunlight at the same time we don't hear the sound of solar explosions.
4. The gravity on the Earth's surface is larger than that on Mars surface.

C Calculate the total masses of reactants and products of the following reaction :

$2H_2 + O_2 \longrightarrow 2H_2O$

Knowing that the mass number of elements as (H = 1 & O = 16)

Question 3

A Choose the correct answer :

1. .... oxides are resulted during the time of lightning.
   a. Carbon b. Sulphur c. Nitrogen d. Basic
2. From the examples of forces inside living organisms is/are ....
   a. inertia. b. brakes. c. pulse inside blood vessels. d. friction.
3. All of the following are covalent molecules except ....
   a. H_2O b. N_2 c. NaCl d. O_2
4. .... are used in night vision apparatus.
   a. Infrared rays b. Ultraviolet rays c. X-rays d. Gamma rays
5. Electromagnet is used in making the ....
   a. cooking food. b. electric bell. c. microscope. d. data show.
6. All of the following are electromagnetic waves except the ....
   a. sound waves. b. ultraviolet waves. c. infrared rays. d. visible light.

B Write the symbolic balanced chemical equation :

1. Burning of carbon in the presence of oxygen.
2. Reaction of hydrochloric acid with ammonia gas.

C Complete the following table :

The chemical formula	KOH	...... (1)	HNO_3	SO_3
Its name	...... (2)	Sodium sulphate	...... (3)	...... (4) ......
Its type	...... (5)	...... (6)	...... (7)	...... (8) ......

Question 4

A Complete the following statements :

1. The bond in oxygen molecule is .... bond but in water molecule is .... bond.
2. The comet consists of two parts which are .... and ....
3. The force of gravity between two objects depends on ....and ....
4. Strong nuclear forces are used in producing ....
5. If a football player is tripped during running forward, he will be ....and .... on the ground.
6. .... motion is regularly repeated at equal periods of time.
7. * Sandstone and .... are examples of .... rocks.

B Compare between :

Inner planets and outer planets according to (size – structure – density).

C What is meant by ... ?

Negative ion.

19 Ismailia Governorate

El-Salam Evangelical Language School

Answer the following questions :

Question 1

A Complete the following statements :

1. The electric motor changes .... energy into .... energy.
2. .... are used in photographing bones fractures.
3. $2Mg + O_2 \xrightarrow{\Delta}$ ....
4. Burning of coal and cellulose fibres causes ....pollution.
5. .... is used in Egypt to generate electricity.
6. * Plutonic rocks have crystals with .... size, while volcanic rocks have crystals with .... size.

B If you know that the mass of carbon = 12 and oxygen = 16, find the total masses of reactants and products through the following reaction : $C + O_2 \xrightarrow{\Delta} CO_2$

C Write the electronic configuration and valency for the following elements :

1. $^{27}_{13}Al$ 2. $^{20}_{10}Ne$ 3. $^{24}_{12}Mg$

PART 3

Question 2

A Choose the correct answer :

1. All of the following are metals except ....
   a. copper. b. aluminium. c. sodium. d. oxygen.
2. The chemical formula of sodium hydroxide is ....
   a. HCl b. Na_2CO_3 c. NaOH d. NaCl
3. The car brakes are one of the applications on .... force.
   a. friction b. inertia c. nuclear d. gravitational
4. The measuring unit of force is ....
   a. kg. b. newton. c. m/s^2. d. m/s.

B Give reasons for the following statements :

1. Policemen advise drivers to use safety belts in cars.
2. The Earth is suitable for life.
3. We see lightning before hearing thunder.

C Compare between inner and outer planets according to :

1. Structure. 2. Size. 3. Density. 4. Definition.

Question 3

A Correct the underlined words :

1. **Hydrogen** gas is used by plants to form proteins.
2. Water molecule consists of three atoms for **four** elements.
3. **Volume** of an object is the Earth's ability to attract that object.
4. **Meteors** consist of masses of rocks, ice and solidified gases.
5. Nonmetals are bad conductors of electricity except **sulphur**.

B If the Earth's gravitational acceleration in a place is 10 m/s^2, find the weight of an object if its mass is 28 kg.

C Give one example for :

1. Mechanical waves.
2. Electromagnetic waves.
3. Transitional motion.
4. Negative ion.
5. Circular motion.

Question 4

A Write the scientific term for each of the following sentences :

1. Oxides that cause building corrosion.

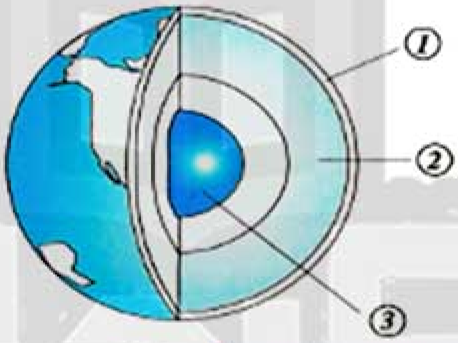
2. The followers of the planets.
3. Resistant forces originate between the object in motion and the medium touching it.
4. A set of joined atoms behaving like a single atom during chemical reaction.
5. * A rock that is produced from the conversion of limestone.

B **Write the number indicating each of the following :**

1. The distance between Earth planet and the Sun.
2. The normal atmospheric pressure.
3. Light year.
4. The atoms of ammonia molecule.

C **The following figure represents the layers of Earth :**

Mention the name of each layer and its thickness.



20 Damietta Governorate — Official Language Schools

Answer the following questions :

Question 1

A **Complete the following statements :**

1. The electric generator changes .... energy into .... energy.
2. On dissolving in water, acids give positive............... ions and alkalis give negative .... ions.
3. Waves are divided into ....waves and .... waves.
4. The force of gravity between two objects depends on .... and ....
5. Green plants use ....gas in photosynthes process and use .... gas to form proteins.
6. * Limestone consists of precipitation of .... in lime solutions.

B **Write the name of each compound from the following and mention its type (acid or oxide or base or salt) :**

1. CaO　　2. KOH　　3. Na_2SO_4　　4. HNO_3

PART 3

C By drawing only, show :

1. The electronic configuration of oxygen atom ($^{16}_{8}O$).
2. How two oxygen atoms are bonded to form oxygen molecule (O_2).

D If the Earth's gravitational acceleration in a place is 9.8 m/sec^2, find the weight of a ball its mass is 0.3 kg.

Question 2

A Write the scientific term :

1. The layer of the Earth that lies beneath the Earth's crust.
2. It is a property of an object to resist the change of its state from rest to motion.
3. It is the breaking down of the bonds in reactants and forming new bonds in the products.
4. Solidified masses of gases, ice and rock pieces revolving around the Sun.
5. A bond that is produced due to electric attraction between a positive ion and a negative ion.
6. The number of electrons that an atom gains, loses or even shares during chemical reaction.

B Mention one application for :

1. Infrared rays. 2. Ultraviolet rays. 3. X-rays. 4. Gamma rays.

C Compare between (one point only for each) :

1. Meteors and meteorites. 2. Periodic motion and transitional motion.
3. The Earth's outer core and inner core.
4. Weak nuclear force and strong nuclear force.

Question 3

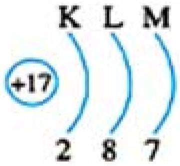
A Give reasons for each of the following :

1. Noble gases don't participate in chemical reactions under the ordinary conditions.
2. A chemical equation should be balanced.
3. The bond in a water (H_2O) molecule is a single covalent bond.
4. The density of outer planets is low.

B Mention one benefit for each of the following :

1. Friction. 2. Telescopes. 3. Electromagnet. 4. Visible light.

C From the electronic configuration for the following element, Complete :



1. The type of element : ....
2. The valency of element : ....
3. The ion of element : ....
4. The type of chemical bond when it combines with sodium ($_{11}Na$) : ....

D Knowing that the mass of carbon (C=12) and oxygen (O = 16).
Find the total masses of reactants and products through the following reaction.

$$C + O_2 \xrightarrow{\Delta} CO_2$$

Question 4

A Choose the correct answer :

1. When a nitrogen atom ($^{14}_{7}N$) gains electrons to complete its outermost shell, it becomes...............
   a. N^{-2} b. N^{-3} c. N^{+2} d. N^{+3}
2. The gas which reduces the effect of oxygen in burning process is ....
   a. CO_2 b. H_2O c. N_2 d. Cl_2
3. The normal atmospheric pressure equals .... cm. Hg.
   a. 76 b. 67 c. 70 d. 72
4. Car brakes are one of the applications of ....
   a. gravitational force. b. friction force. c. nuclear force. d. inertia force.
5. The biggest units of universe are ....
   a. planets. b. stars. c. galaxies. d. moons.
6. .... are poisonous and affect the nervous system and the eye.
   a. Cellulose fibres b. Sulphur oxides
   c. Carbon oxides d. Nitrogen oxides

B What happens when ... ?

1. Putting the red litmus paper in a tube containing (NaOH) solution.
2. Approaching a wet rod with hydrochloric acid to ammonia gas. (write the chemical equation for this reaction).
3. Absence of ozone layer in the atmosphere.
4. Burning a magnesium ribbon in air. (chemical equation).

PART 3

21 Port Said Governorate

Science Inspectorate for Language School

Answer the following questions :

Question 1

A Complete each of the following statements :

1. .... is the only liquid metal, while .... is the only liquid nonmetal.
2. The electromagnet is used in many devices such as .... and ....
3. .... and .... are two different types of telescopes that are used to identify celestial bodies.
4. The motion of the pendulum is a .... periodic motion, while the movement of the Moon around the Earth is a .... periodic motion.
5. * .... gas evolves when hydrochloric acid reacts with limestone.

B Give reasons for :

1. The atom changes into a positive ion when it loses one electron or more.
2. Without ozone layer, all living organisms on Earth will die.
3. * The plant roots extend easily through the upper part of the Earth's crust, but can't extend through its lower part.

C Write down the chemical formula of :

1. Calcium hydroxide.
2. Copper carbonate.

Question 2

A Write the scientific term :

1. Elements in which their outermost shells are completely filled with electrons.
2. Resistant force (against motion) is originated between the surface of the object in motion and the medium touching it.
3. Masses of rocks, ice and solidified gases rotate around the Sun in more elongated elliptical orbits.
4. Waves which are spread out in all media and space with extremely great speed.
5. Gas used by plants to form proteins.

B Compare between each two of the following :

1. Carbon oxides and sulphur oxides (examples only).
2. Electric generator and electric motor (in terms of energy conversions).
3. Meteors and meteorites (definition only).

C Calculate the total mass of the reactants and the products in the following reaction :

$$C + O_2 \xrightarrow{\Delta} CO_2$$

If you know that the mass of carbon is (C = 12) and the mass of oxygen is (O = 16).

Question 3

A Correct the underlined words :

1. Mercury is one of the <u>outer</u> planets.
2. The chemical formula of sodium chloride is <u>AgCl</u>
3. <u>Mass</u> is the amount of Earth's attraction to an object.
4. The distances between stars are measured by a unit called <u>kilometer</u>.
5. <u>Carbon oxides</u> are resulted at the time of lightning.
6. The Earth locates in the <u>fifth</u> position regarding the distance from the Sun.
7. The salty water represents <u>71%</u> of the water you see on the Earth's surface and it exists in oceans and seas.

B Write down the electronic configuration of each of the following atoms, and then mention the type of each atom (metal – nonmetal) : $_{12}Mg$ – $_{16}S$

C If the Earth's gravitational acceleration is 9.8 m/sec^2. Find the weight of a ball, its mass is 0.3 kg.

Question 4

A Choose from column (B) what suits it in column (A) :

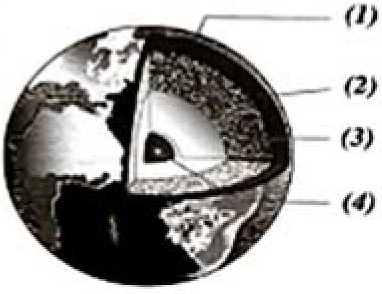
(A)	(B)
1. Vehicles passengers are rushed forward once the vehicles suddenly stop 2. Weak nuclear forces 3. Contraction and relaxation of the esophagus muscles	a. are used in treating headache and fainting. b. occurs by the effect of forces inside complex living systems. c. occurs by the effect of inertia. d. are used in medicine, scientific researches and industry.

B What is meant by ... ?

1. Ionic bond. 2. Valency. 3. Relative motion. 4. Asteroids.

C The opposite figure illustrates an Earth's sector :

1. Write the labels (1,2, 3 and 4).
2. What are the elements that form layer no. (4) ?



PART 3

22 El-Behira Governorate

Ismail El-Habrouk Formal Language School

Answer the following questions :

Question 1

A Choose the correct answer :

1. The amount of Earth's gravitational pull on the object is ....
   a. object's mass. b. object's weight.
   c. gravitational acceleration. d. centrifugal force.
2. The number of electrons in the outermost energy level of (O^{-2}) equals to the number of electrons in the outermost energy level of ....
   a. $_{20}Ca$ b. $_{18}Ar$ c. $_{11}Na$ d. $_{13}Al$
3. All of the following are metallic oxides except ....
   a. Na_2O b. MgO c. SO_3 d. Al_2O_3
4. Increasing the ratio of .... gas in the atmosphere leads to increasing the air temperature.
   a. carbon monoxide b. carbon dioxide
   c. sulphur dioxide d. nitrogen monoxide
5. Water transports from soil to leaves of plant by the effect of ....
   a. gravitational forces. b. force of inertia.
   c. biological forces. d. friction forces.

B Give reasons for each of the following :

1. Astronauts can't hear each other voices directly in the space.
2. Chemical equation should be balanced.
3. Policemen advise drivers to use safety belts in cars.

C Knowing that the mass of carbon =12 and oxygen =16 Calculate :

The total mass of reactants and products through the following reaction

$$2CO + O_2 \xrightarrow{\Delta} 2CO_2$$

Question 2

A Choose the odd word out, then link between the rest words :

1. $_2He - _{18}Ar - _{10}Ne - _{16}S$

2. Light waves – Sound waves – Microwaves – Radio waves.

3. Headache – Fainting – Respiratory system malfunction – Severe stomach aches.

B Mention one application or importance for each of the following :

1. Ultraviolet rays. 2. Electromagnet. 3. Telescopes.

C Write an appropriate comment about reason of inertia below each figure :



Fig. (A)



Fig. (B)

Question 3

A Complete the following statements :

1. From salts which dissolve in water is .... but .... doesn't dissolve in water.
2. Factors affecting the gravity force between planets are .... and ....
3. Atmospheric pressure on the Earth's surface equals ....
4. Friction force is important for .... and ....
5. * Igneous rocks are divided according to the site of their formation in the Earth's surface into .... and ....

B What happens when ... ?

1. Approaching a wet rod with hydrochloric acid to ammonia gas. (Write the chemical equation).
2. Absence of ozone layer.
3. * Decreasing the temperature of lava on the Earth's surface rapidly.

C A spaceship its mass 500 kg, is launched from Earth towards Mars. Calculate each of the following :

1. Weight of this spaceship on Earth and on Mars.
2. Mass of this spaceship on Mars's surface.

(Knowing that : the gravity on the Earth's surface = 9.8 m/s^2 and the gravity on Mars's surface = 3.72 m/s^2).

Question 4

A Write the scientific term for each of the following :

1. It is the breaking of the bonds existed between the atoms of reactants molecules, and forming new bonds between the atoms of the products molecules.
2. A set of different atoms joined together and behave like a single atom during a chemical reaction.
3. The distance covered by the light in a year and equals 9.467×10^{12} km.
4. Motion which is regularly repeated in equal periods of time.

B Answer the following :

1. $Al_2(SO_4)_3$
   a. Number of atoms equals .... b. Number of elements equals ....
2. Cl_2 (atomic number of Cl is 17)
   a. Type of element is .... b. Valency of element is ....
3. Fe_2O_3
   a. Name of compound is .... b. Type of compound is ....

C Compare between each of the following :

1. Meteors and meteorites. (In terms of: definition).
2. Ionic bond and covalent bond. (In terms of: examples).

23 Fayoum Governorate

Science Supervision For Governmental Language School

Answer the following questions :

Question 1

A Complete the following sentences :

1. The chemical formula of hydrochloric acid is .... but the chemical formula of sodium hydroxide is ....
2. From the sets which depend on electromagnetic forces to work are the .... and the ....
3. The nearest planet to the Sun is ...., but .... is the biggest one in the solar system.
4. The bond in sodium chloride compound is ...., but the bond in molecule of oxygen gas is ....

B Define :

1. Chemical reaction. 2. Asteroids. 3. Inertia.

C Mention one importance for each of the following :

1. Ultraviolet rays. 2. Sound waves. 3. Strong nuclear force.

Question 2

A Correct the underlined words in the following statements :

1. The idea of machines lubrication depends on the decreasing of **the gravity**.
2. **Salts** are substances that dissociate in water producing negative hydroxide ions $(OH)^-$.
3. The water bodies represent about **50%** of the Earth's surface.
4. Inner core of the Earth is rich in iron and **aluminium**.
5. **Mass** is an attraction amount of the Earth to the body.
6. Electric generator (dynamo) converts the kinetic energy into **heat** one.

B Write the chemical equation representing the following reactions, then indicate the type of reaction :

1. The reaction between carbon monoxide with oxygen.
2. Hydrochloric acid is combined with ammonia gas.

C Give one difference between each of the following :

1. Light waves and sound waves.
2. Inner planets and outer planets.

D Calculate the weight of an object if its mass is 10 kg. and the Earth's gravitational acceleration is 9.8 m/sec^2.

Question 3

A Write the scientific term for each of the following :

1. The distance covered by light in one year.
2. It is an atom that loses one electron or more during the chemical reaction.
3. Huge solid rocky masses that fall from the space, do not burn up completely and some parts of them reach the Earth's surface.
4. Elements don't participate in chemical reactions under the ordinary conditions due to the completeness of their outermost energy levels with electrons.
5. An effect attempts to change the object phase from being static to motion or vice versa or attempts to change the motion direction.

PART 3

B Choose the correct answer :

1. Telescope is used in studying the...............
   a. intensity of earthquakes. b. minerals.
   c. volcanoes. d. celestial bodies.
2. The biggest units of the universe are...............
   a. planets. b. stars. c. galaxies. d. moons.
3. All of the following are periodic motions except the ....
   a. fan motion. b. pendulum motion.
   c. train motion. d. sunflower motion.
4. All of the following are metals except ....
   a. iron. b. oxygen. c. copper. d. sodium.
5. From the examples of forces inside living systems is/are ....
   a. pulse inside blood vessels. b. inertia.
   c. brakes. d. all the previous answers.
6. * .... are examples of sedimentary rocks.
   a. Granite and basalt b. Marble and sandstone
   c. Sandstone and limestone d. Basalt and limestone

C What happens when ... ?

1. Burning magnesium ribbon in air.
2. There is no ozone layer in the atmosphere.

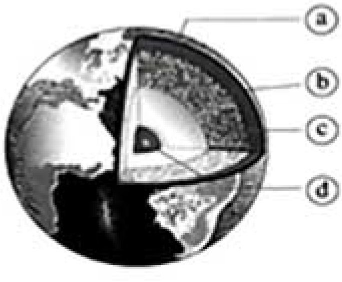
Question 4

A Give reasons for :

1. Acids change the colour of litmus paper into red.
2. Burning of coal and cellulose fibres has bad effects.
3. An object's weight is changed from a planet to another.
4. * We can differentiate between the sandstone and limestone from colour and texture.

B Look at the opposite figure, then answer :

1. Write the names of ⓐ , ⓑ , ⓒ and ⓓ :
2. Which layer is formed of molten metals ?



C Write down the electronic configuration for the atoms of the following elements :

$_{17}Cl - _{10}Ne$

then indicate :

1. The type of each atom (metal – nonmetal – noble gas).
2. The type of each ion (positive – negative – has no ions).
3. Valency of each atom.

24 Beni Suef Governorate

Official Language School

Answer the following questions :

Question 1

A Complete the following sentences :

1. The biggest body in the solar system is the ...., while the biggest inner planet is the ....
2. The liquid metal is ...., while the liquid nonmetal is ....
3. Sound is from ....waves, while light is from .... waves.
4. Inner core is rich in .... and ....
5. * Granite rock consists of .... , ... and .... minerals, while basalt rock consists of .... , ... and .... minerals.

B Mention one importance for :

1. Infrared rays.
2. Electromagnet.
3. Gravity on Earth.

C A metallic element (x) its electrons are distributed in four energy levels. Number of electrons in the first and last energy levels of this element are equal. And mass number of this element is double its atomic number. Number of neutrons in its atom is equal to its atomic number.

Number of electrons in its ion is 18 electrons. Answer the following :

1. Electronic configuration.
2. Type of its ion.
3. Type of bond with $^{16}_{8}O$
4. Type of bond with $_{18}Ar$. Give reason for your answer.

PART 3

Question 2

A Write the chemical equation for the following :

1. Reaction between carbon monoxide with oxygen.
2. Burning a magnesium ribbon with oxygen.

B If the Earth's gravitational acceleration in a place is 9.8 m/s^2. Find the weight of the following :

1. 0.3 kg. mass ball.
2. 50 kg. mass boy.

C Write the scientific term :

1. An object position changes as time passes from its initial position to a different final one.
2. Solidified masses of gases, ice and rocks revolve around the Sun.
3. A gas represents 21% of the air volume.
4. Compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
5. The farthest planet from the Sun.

Question 3

A Compare between each of the following :

1. Sodium sulphide and lead sulphate.
2. Inner planets and outer planets related to (density - number of moons).
3. Crust and mantle related to (thickness).
4. Weak nuclear force and strong nuclear force related to (one use only for each).

B Give reasons for :

1. When an atom gains an electron or more, it becomes a negative ion.
2. Astronauts can't hear each other voices directly in space.
3. Policemen advise drivers to use safety belts in cars and planes.
4. Car tyres are covered with very coarse substances.
5. Chemical equation should be balanced.

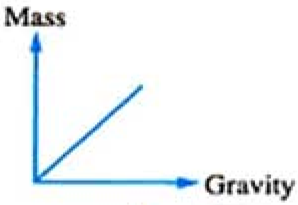
C Write the chemical formula of each of the following :

1. Calcium nitrate.
2. Copper sulphate.
3. Sodium carbonate.
4. Aluminium oxide.
5. Ammonium nitrate.

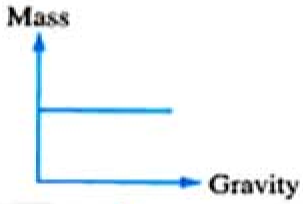
Question 4

A Choose the correct answer :

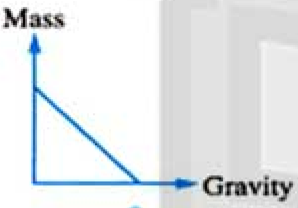
1. Which graph that represents the relation between mass of any planet and its gravity ? ....



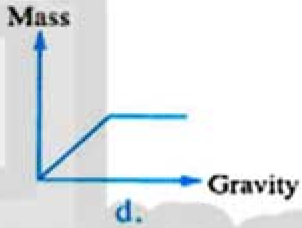
a.



b.



c.



d.

2. If you are in a moving train, you imagine that the cars moving in the same direction on the road with same speed ....

   a. stop.   b. move forward.
   c. move backward.   d. move with a high speed.

3. The Earth takes............... to rotate around the Sun.

   a. 24 hours   b. 365.25 days   c. 30 days   d. 60 minutes

4. The triple covalent bond is formed in .... molecule.

   a. hydrogen   b. nitrogen   c. oxygen   d. water

5. Visible light is used in all the following applications except ....

   a. night vision apparatus.   b. television cameras.
   c. photographic cameras.   d. data shows.

6. In positive ion, the number of protons is .... the number of electrons.

   a. less than   b. more than   c. equal to   d. no correct answer

B Mention the following digits are referring to :

1. 8 planets.   2. 5.9×10^{24} kg.   3. 9.467×10^{12} km.
4. 76 cm.Hg.   5. 0.03%   6. 71%

C Calculate the masses of reactants and products in the following reaction :

$C + O_2 \xrightarrow{\Delta} CO_2$ [Knowing that the mass of (C=12 & O= 16)]

PART 3

25 Sohag Governorate

Sohag Educational Zone

Answer the following questions :

Question 1

A Complete the following sentences :

1. The bond in (NaCl) molecule is .... bond, while the bond in (N_2) molecule is .... bond.
2. Waves are divided into two types which are ....waves and .... waves.
3. The Earth's inner core is rich in .... and ....

B Calculate the mass of an object, its weight is 98 newton. knowing that the Earth's gravitational acceleration = 9.8 m/sec^2

C Write the chemical equation representing the following reactions :

1. Reaction between carbon monoxide with oxygen.
2. Reaction between ammonia and conc. hydrochloric acid.

Question 2

A Write the scientific term :

1. It is the number of electrons gained, lost or even shared by an atom during the chemical reaction.
2. It is a resistant force originated between the object in motion and the medium touching it.
3. It is a type of electromagnetic waves which have heat effect.
4. Breaking of the bonds in the reactants molecules and forming new bonds in the products molecules.
5. The motion which is regularly repeated at equal periods of time.

B Mention the importance of :

1. Ozone layer. 2. Ultraviolet rays. 3. Nitrogen gas.

C Correct the underlined words :

1. <u>Mass</u> of an object is the Earth's ability to attract that object.
2. <u>Fresh</u> water represents 97% and exists in oceans and seas.
3. <u>Sulphur oxides</u> are poisonous acidic gases that affect the nervous system and the eye.

Question 3

A Choose the correct answer :

1. Planets revolve around the Sun in .... paths.
   a. circular b. elliptical c. spiral d. irregular

2. Regarding the volume, Earth occupies the .... order (descendingly) in the solar system.

a. fifth b. fourth c. third d. eighth

3. Water masses on Earth's surface form about ....

a. 30% b. 50% c. 71% d. 90%

4. When a nitrogen atom $^{14}_{7}N$ gains electrons to complete its outermost shell, it becomes ....

a. N^{-2} b. N^{-3} c. N^{+3} d. N^{+2}

5. All of the following are covalent molecules except ....

a. H_2O b. MgO c. N_2 d. O_2

6. * The plant roots extend easily through the Earth's ....

a. crust. b. mantle. c. outer core. d. inner core.

B Calculate the total masses of reactants and products of the following reaction :

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$

[Knowing that the mass number of Mg = 24 & O = 16]

C Write the chemical formula for each of the following :

1. Sulphuric acid. 2. Calcium nitrate. 3. Aluminium oxide.

Question 4

A Give reasons for :

1. Policemen advise drivers to use safety belts in cars and planes.
2. Object's weight changes from one place to another on the Earth's surface.
3. Steadfastness of the hydrosphere on Earth's surface.
4. Potassium $_{19}K$ is monovalent, where oxygen $_{8}O$ is divalent.

B Put (✓) or (✗), then correct the wrong ones :

1. Mantle layer lies beneath the Earth's outer core. ( )
2. Earth's radius between the two poles is larger than that at the equater. ( )
3. Acids change the colour of red litmus paper into blue. ( )
4. The normal atmospheric pressure is 70 cm.Hg. ( )
5. Calcium nitrate $Ca(NO_3)_2$ dissolves in water. ( )
6. Simple pendulum motion is a wave motion. ( )

SCIENCE

GUIDE ANSWERS

2022

SECOND TERM

BY A GROUP OF SUPERVISORS



1st prep.

EL-MOASSER

SERIES

Unit One

Lesson 1

1

1. b	2. c	3. d	4. b	5. d
6. a	7. b	8. b	9. d	10. a
11. c	12. d	13. c	14. a	15. c
16. a	17. d	18. c	19. c	20. c
21. a	22. c	23. b	24. b	25. b
26. d	27. d	28. b	29. c	30. c
31. b	32. b	33. d		

2

1. (✓)
2. (✗) ...... into positive ions.
3. (✓)
4. (✗) ...... is less than ......
5. (✓)
6. (✓)
7. (✗) ...... has 8 electrons.
8. (✓)
9. (✗) ...... monoatomic molecules.
10. (✗) Covalent bond ......
11. (✗) ...... is an ionic bond.
12. (✗) ...... magnesium atom gives two electrons to oxygen atom.
13. (✓)
14. (✓)
15. (✗) ...... is a single covalent bond.
16. (✓)
17. (✓)
18. (✓)
19. (✗) ...... is a single covalent bond.

3

1. Metals.
2. Mercury.
3. Nonmetals.
4. Bromine.
5. Graphite (carbon).
6. Positive ion.
7. Negative ion.
8. Ion.
9. Noble gas.
10. Noble gases.
11. Ionic bond.
12. Ionic bond.
13. Covalent bond.
14. Single covalent bond.
15. Double covalent bond.
16. Triple covalent bond.

4

1. 118
2. metals - nonmetals – noble gases.
3. four
4. solids – mercury
5. Metallic
6. metals – positive
7. Sodium – magnesium
8. loses – positive
9. two – eight.
10. more
11. nitrogen - carbon.
12. bad – graphite – a good
13. metals – nonmetals
14. metals – nonmetals
15. Mercury – bromine
16. seven – ten
17. O^{-2} – Na^{+}
18. a nonmetallic – a metallic
19. noble gas
20. Noble gases – electrons.
21. metallic – nonmetallic
22. a positive ion – a negative ion.
23. gains – negative
24. magnesium – two – oxygen
25. Sodium chloride – magnesium oxide
26. nonmetallic
27. covalent
28. ionic – double covalent
29. ionic – single covalent
30. gains – shares with
31. single – double – triple.
32. single covalent – triple covalent

5

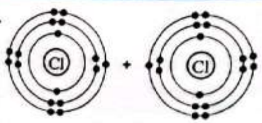
(A)

Element	Its electronic configuration				No. of protons	Its type	No. of electrons in ion	Type of ion	Symbol of its ion
	K	L	M	N					
1. $_{12}Mg$	2	8	2	–	12	Metal	10	Positive	Mg^{+2}
2. $_{15}P$	2	8	5	–	15	Nonmetal	18	Negative	P^{-3}
3. $_{18}Ar$	2	8	8	–	18	Inert gas	No ion	No ion	No ion
4. $_{17}Cl$	2	8	7	–	17	Nonmetal	18	Negative	Cl^{-}
5. $_{19}K$	2	8	8	1	19	Metal	18	Positive	K^{+}

(B)

Atom	Electronic configuration			Molecule	Type of bond
	K	L	M		
1. $_{11}Na$	2	8	1	NaCl	Ionic
$_{17}Cl$	2	8	7		
2. $_{12}Mg$	2	8	2	MgO	Ionic
$_{8}O$	2	6	–		
3. $_{7}N$	2	5	–	N_2	Triple covalent
4. $_{8}O$	2	6	–	O_2	Double covalent

6

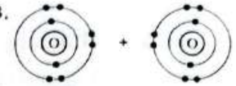
1. 

- Single covalent bond.

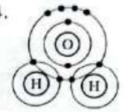
2. 

- Single covalent bond.

Hydrogen molecule (H_2)

3. 

- Double covalent bond.

4. 

- Single covalent bond.

Water molecule (H_2O)

7

1. Because the number of electrons in ion is less than or more than its number in the same atom by the number of lost or gained electrons.
2. Because the number of electrons becomes less than the number of protons.
3. Because the number of electrons becomes more than the number of protons.
4. Because the atom of a metallic element loses the outermost electrons forming a positive ion.
5. Because sodium atom loses its outermost electron and changes into a positive ion, while oxygen atom gains two electrons to complete its outermost energy level and changes into a negative ion.
6. Due to the completeness of their outermost energy levels with electrons.
7. Because sodium ion is formed when sodium atom loses one electron and changes into (Na^{+}) which contains 10 electrons, while oxygen ion is formed when oxygen atom gains two electrons and changes into (O^{-2}) which contains 10 electrons too.
8. Because magnesium loses two electrons and changes into a positive ion, while oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions.
9. Because each of them is a metal and their atoms tend to lose the outermost electrons during chemical reactions.
10. Because ionic bond arises between two different atoms (metal and nonmetal) as a result of the electric attraction between a positive ion of an atom of a metallic element and a negative ion of an atom of a nonmetallic element, while covalent bond arises between two similar or different nonmetal atoms.
11. Because chlorine atom (nonmetal) gains the electron which is lost by sodium atom, so an electric attraction occurs between positive sodium ion and negative chloride ion, while each of the two chlorine atoms share with one electron to complete its outermost shell.
12. Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable.
13. Because it arises by sharing each oxygen atom with two electrons to complete its outermost shell with 8 electrons and becomes more stable.
14. Because oxygen atom shares each of the two hydrogen atoms with one electron.
15. Because it arises by sharing each nitrogen atom with three electrons to complete its outermost shell with 8 electrons and becomes more stable.

8

1. They are elements which contain 1 or 2 or 3 electrons in the outermost energy level.
2. They are elements which contain 4 or 5 or 6 electrons in the outermost energy level.
3. It is an atom of a metallic element which loses an electron or more during the chemical reaction.
4. It is an atom of a nonmetallic element which gains an electron or more during the chemical reaction.
5. It is the atom of an element which loses or gains an electron or more during the chemical reaction.
6. They are elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.
7. It is a chemical bond resulted from the electric attraction between a positive ion and a negative ion.

8. It is a chemical bond formed between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.
9. It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with one electron.
10. It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with two electrons.
11. It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with three electrons.

9
1. It will be fragmented easily, because carbon is from nonmetals which are not malleable.
2. It changes into a positive ion carries a number of positive charges equals to the number of given electrons.
3. It changes into a negative ion carries a number of negative charges equals to the number of gained electrons.
4. Magnesium loses two electrons and changes into a positive ion and oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions to form a molecule of magnesium oxide.
5. Each atom shares with one electron to become the outermost shell of each of them completed with electrons.
6. Each oxygen atom shares with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

10

Odd word (or symbol)	Scientific name
1- Mercury	Solid metals.
2- $_{17}Cl$	Metals.
3- $_{11}Na$	Elements, their ions carry two positive charges.
4- Graphite	Nonmetals are bad conductors of electricity.
5- Sodium	Nonmetals.
6- $_5B$	Nonmetals.
7- $_{11}Na$	Noble (inert) gases.
8- Table salt molecule	Covalent molecules.

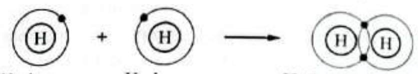
11

Element	Electronic configuration			1. Its type	2. The type of its ion
	K	L	M		
$_{18}Ar$	2	8	8	Noble gas	No ion
$_{12}Mg$	2	8	2	Metal	Positive (Mg^{+2})
$_{16}S$	2	8	6	Nonmetal	Negative (S^{-2})

12

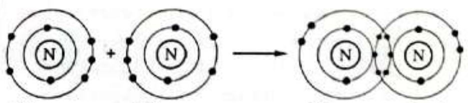
Element	Electronic configuration				1. Its type	2. The type of its ion
	K	L	M	N		
$_1H$	1	–	–	–	Nonmetal	Negative
$_{11}Na$	2	8	1	–	Metal	Positive
$_7N$	2	5	–	–	Nonmetal	Negative
$_{10}Ne$	2	8	–	–	Noble gas	No ion
$_8O$	2	6	–	–	Nonmetal	Negative
$_{17}Cl$	2	8	7	–	Nonmetal	Negative
$_{19}K$	2	8	8	1	Metal	Positive

3. a. By sharing of each atom by one electron to form single covalent bond (H – H).



Hydrogen atom + Hydrogen atom → Hydrogen molecule (H_2)

b. By sharing of each atom by three electrons to form triple covalent bond (N ≡ N).



Nitrogen atom + Nitrogen atom → Nitrogen molecule (N_2)

4. Neon (Ne).

13
1. *Look at the main book on page (19).*
2. *Look at the main book on page (20).*
3.

P.O.C.	Mercury	Bromine
- Type of element :	Metal	Nonmetal
- Physical state :	Liquid	Liquid
- Luster :	It has a metallic luster	It hasn't a metallic luster

4.

P.O.C.	Aluminium	Graphite
- Electric conduction :	Good	Good
- Heat conduction :	Good	Bad
- Ability to malleable and ductile :	It is malleable and ductile.	It isn't malleable or ductile.

5. *Look at the main book on page (20).*
6. *Look at the main book on page (28).*
7.

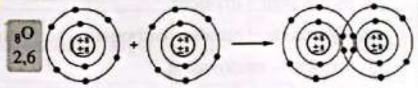
Single covalent bond (–)	Double covalent bond (=)	Triple covalent bond (≡)
- It is a chemical bond which arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares by one electron.	- It is a chemical bond which arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares by two electrons.	- It is a chemical bond which arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares by three electrons.
Ex.: - Hydrogen molecule (H – H)	Ex.: - Oxygen molecule (O = O)	Ex.: - Nitrogen molecule (N ≡ N)

14
1. • **Graphite :** It is a good conductor of electricity.
   • **Oxygen :** It is a bad conductor of electricity.
2. • **Sodium atom (Na) :** It has neutral charge.
   • **Sodium ion (Na^+) :** It carries one positive charge.
3. • **Oxygen molecule (O_2) :** There is a double covalent bond between the two oxygen atoms.
   • **Two oxygen atoms (2O) :** There isn't bond between the two atoms.

15
1. *Look at the main book on page (13).*
2. *Look at the main book on page (16).*

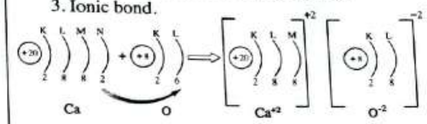
16 Because iron is a metallic element which is malleable so, it will be not broken, while coal is a nonmetal element which is not malleable so, it will be broken.

17



Oxygen atom + Oxygen atom → Oxygen molecule (O=O) or (O_2).

18
1. *Look at the main book on page (26).*
2. *Look at the main book on page (24).*
3. Ionic bond.



4 , 5 & 6. *Look at the main book on pages (24 , 26 & 27).*

19

	1. Type of element & ion	2. No. of electrons which lost or gained
Fig. (a)	Nonmetal - Negative ion	Gains one electron
Fig. (b)	Nonmetal - Negative ion	Gains three electron
Fig. (c)	Metal - Positive ion	loses two electrons
Fig. (d)	Inert gas - No. ion	Zero
Fig. (e)	Metal - Positive ion	loses one electron

3. Fig. (c) and Fig. (e)

20 1. Fig. (b) 2. Fig. (a) 3. Fig. (c)

21
1. *Look at the main book on page (24).*
2. Ionic bond.

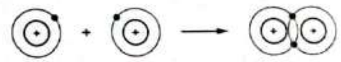
Thinking Skills Questions

1 1. c 2. c 3. a 4. d 5. c 6. c

2
1. (S) & (P) 2. (P)
3. Negative ion , because it is a nonmetal that gains 3 electrons during the chemical reaction.
4. (S) , because its atomic number = 2 + 8 + 1 = 11

3
1. Because they are malleable and ductile and they have metallic luster.
2. Because they are good conductors of heat.

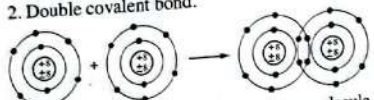
4
1. **Element (A)** is a nonmetal.
   Element (B) is a metal.
   Element (C) is a noble gas.
   Element (D) is a nonmetal.
2.



Hydrogen atom + Hydrogen atom → Hydrogen molecule (H_2)

3. Ionic bond.
4. Single covalent bond.
5. Because its outermost energy level is completely filled with 8 electrons.

5 1. **Element (A)** is a nonmetal.
Element (B) is a metal.
2. Double covalent bond.



3. ***Look at the main book on page (24).***

6

Atomic number	Type of element	Electronic configuration
1. 8	Nonmetal	(+8) K: 2, L: 6
2. 19	Metal	(+19) K: 2, L: 8, M: 8, N: 1
3. 15	Nonmetal	(+15) K: 2, L: 8, M: 5
4. 20	Metal	(+20) K: 2, L: 8, M: 8, N: 2

Lesson 2

1

1. c	2. b	3. c	4. b	5. a
6. b	7. a	8. a	9. d	10. a
11. d	12. a	13. d	14. b	15. c
16. a	17. d	18. c	19. d	20. c
21. c	22. b	23. a	24. c	25. c
26. b	27. c	28. b	29. d	30. c
31. b	32. c	33. a	34. d	35. b
36. d	37. d	38. b	39. d	40. b
41. c	42. c			

2

1. g	2. h	3. e	4. a
5. d	6. b	7. c	8. f

3 ① 1. b - C 2. c - A 3. d - D 4. a - B
② 1. a - B 2. c - A 3. b - C

4 1. (✓)
2. (✗) ...... two positive charges.
3. (✗) ...... three atoms ......
4. (✗) ...... is zero.
5. (✗) ...... as one atom ......
6. (✓) 7. (✓)
8. (✗) ...... is $(CO_3)^{-2}$
9. (✗) ...... (Y) is monovalent and (X) is divalent.
10. (✗) ...... is trivalent.
11. (✓) 12. (✓) 13. (✓)
14. (✗) ...... is $Al_2(SO_4)_3$
15. (✗) (Na_2O) is ...... 16. (✓)
17. (✗) The valency of sodium in (NaCl) and (Na_2CO_3) is monovalent.
18. (✗) ...... two monovalent elements.
19. (✗) ...... is $Ca(OH)_2$
20. (✗) ...... of sulphuric acid is (H_2SO_4)
21. (✗) ...... is hexavalent.
22. (✗) Acids ......
23. (✗) ...... into blue.
24. (✗) ...... except hydroxide group.
25. (✗) ...... it produces (Z_2O) oxide ......
26. (✓) 27. (✓)
28. (✗) ...... form salts.
29. (✗) ...... a salt.
30. (✗) ...... is water insoluble, while sodium chloride is water soluble.

5 1. Valency. 2. Inert (noble) gases.
3. Atomic group. 4. Chemical formula.
5. Acids. 6. Bases.
7. Oxides. 8. Metal oxides.
9. Nonmetal oxides. 10. Salts.

6 1. monovalent – divalent
2. trivalent – divalent.
3. iron – copper. 4. divalent – trivalent.
5. nitrogen – sulphur – phosphorus.
6. divalent – tetravalent – hexavalent.
7. trivalent – pentavalent.
8. zero – completely filled
9. monovalent – divalent.
10. Hydroxide – nitrate – carbonate – sulphate
11. divalent – monovalent.
12. $(PO_4)^{-3}$ – trivalent.

13. $(SO_4)^{-2}$ – five – two 14. oxygen
15. Na_2CO_3 – six – three
16. trivalent – divalent.
17. $MgSO_4$ – $Ca(NO_3)_2$
18. HCl – NaOH 19. H_2O – H_2SO_4
20. tetravalent.
21. divalent – $Ca_3(PO_4)_2$
22. sodium oxide – $MgCO_3$
23. monovalent – monovalent.
24. acids – oxides – salts.
25. hydrogen – hydroxide
26. sour – red – bitter – blue.
27. NaOH – $Mg(OH)_2$
28. Sulphuric acid – hydrochloric acid
29. an acid – a base.
30. hydrogen – hydroxide
31. Sodium oxide – carbon dioxide
32. soluble – insoluble

7

Compound	Chemical formula	No. of atoms in the molecule	No. of elements forming the molecule	Its type
1. Sodium carbonate	Na_2CO_3	6	3	Salt
2. Copper carbonate	$CuCO_3$	5	3	Salt
3. Sodium hydroxide	NaOH	3	3	Base
4. Aluminium sulphate	$Al_2(SO_4)_3$	17	3	Salt
5. Calcium oxide	CaO	2	2	Oxide
6. Magnesium nitrate	$Mg(NO_3)_2$	9	3	Salt
7. Copper nitrite	$Cu(NO_2)_2$	7	3	Salt
8. Aluminium hydroxide	$Al(OH)_3$	7	3	Base
9. Calcium carbonate	$CaCO_3$	5	3	Salt
10. Sulphuric acid	H_2SO_4	7	3	Acid
11. Magnesium oxide	MgO	2	2	Oxide
12. Sodium phosphate	Na_3PO_4	8	3	Salt

8 1. Because during chemical reactions, potassium atom loses one electron, while oxygen gains or shares with two electrons to complete their outermost shell.
2. Because during chemical reactions, sodium atom loses one electron, while chlorine atom gains or shares with one electron to complete their outermost shell.
3. Because their outermost energy levels are completely filled with electrons, so they don't lose, gain or share with any electrons.
4. Because during chemical reactions, magnesium atom loses two electrons, while aluminium atom loses three electrons.
5. Because oxygen is divalent, while sodium is monovalent.
6. Because sodium is monovalent, while carbonate is divalent group, so two atoms of sodium combine with one atom of carbonate group.
7. Because oxygen is divalent, while hydrogen is monovalent, so two atoms of hydrogen combine with one atom of oxygen.
8. Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue.
9. Because acids produce positive hydrogen ions H^+ Which responsible for their properties, while bases produce negative hydroxide ions $(OH)^-$ Which responsible for their properties.
10. Because sodium chloride is water soluble salt, while silver chloride is water insoluble salt.
11. Because caustic soda contains negative hydroxide ion, while lead bromide is formed from combination of positive metal ion with negative nonmetal ion.

9 1. It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
2. This means that magnesium loses two electrons during a chemical reaction and changes into Mg^{+2}.

3. This means that iron atom loses three electrons forming positive ion.
4. This means that this element during the chemical reaction, its atom gains or shares with three electrons.
5. It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it isn't existed solely.
6. It is a formula that represents the number and the type of the atoms in a molecule.
7. They are substances which dissociate in water producing positive hydrogen ions H^+.
8. They are substances which dissociate in water producing negative hydroxide ions $(OH)^-$.
9. They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
10. They are compounds produced from the combination of oxygen with a metal.
11. They are compounds produced from the combination of oxygen with a nonmetal.
12. They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

10

Odd word (or formula)	The relation between the rest
1. Aluminium	Monovalent metallic elements.
2. Oxygen	They are metals.
3. Chlorine	They have more than one valency.
4. Potassium	Monovalent nonmetallic elements.
5. Aluminium	Divalent metallic elements.
6. Ammonium	They are negative atomic groups.
7. HCl	They are bases.
8. Al_2O_3	They are nonmetal oxides.
9. SO_3	They are metal oxides.
10. H_2O	They are acids.
11. AgCl	They are water soluble salts.

11 1. Sodium (Na). 2. Hydrogen (H).
3. Oxygen (O). 4. Nitrogen (N).
5. Argon (Ar).
6. Nitrate group $(NO_3)^-$.
7. Phosphate group $(PO_4)^{-3}$.
8. Sulphate group $(SO_4)^{-2}$.
9. Sodium hydroxide (NaOH).
10. Hydrochloric acid (HCl).
11. Aluminium oxide (Al_2O_3).
12. Sulphuric acid (H_2SO_4).
13. Silver chloride (AgCl).
14. Sodium chloride (NaCl).
15. Sodium hydroxide (NaOH).

12 1. Calcium sulphate (6 atoms).
2. Lithium bicarbonate (6 atoms).
3. Magnesium hydroxide (5 atoms).
4. Sulphuric acid (7 atoms).
5. Sodium phosphate (8 atoms).
6. Potassium nitrate (5 atoms).
7. Magnesium phosphate (13 atoms).
8. Carbon dioxide (3 atoms).
9. Aluminium sulphate (17 atoms).
10. Sodium nitrate (5 atoms).
11. Calcium hydroxide (5 atoms).
12. Calcium phosphate (13 atoms).
13. Calcium carbonate (5 atoms).
14. Hydrochloric acid (2 atoms).

13 1. NaOH 2. $NaHCO_3$ 3. Na_2SO_4
4. $Cu(NO_3)_2$ 5. MgO 6. HNO_3
7. H_2SO_4 8. $Ca(OH)_2$ 9. $Ca(HCO_3)_2$
10. $CaSO_4$ 11. FeO 12. KCl
13. $CuSO_4$ 14. Al_2O_3 15. $Ca(NO_3)_2$
16. $AgNO_3$ 17. AgCl 18. HCl
19. NaCl 20. $CaCl_2$ 21. $Al(OH)_3$
22. NH_4Cl 23. K_2SO_4 24. Na_2CO_3
25. Na_2O 26. K_2CO_3 27. SO_3
28. H_2O

14 1. *Look at the main book on page (52).*
2. *Look at the main book on page (53).*

15 1. A base. 2. A salt.
3. A metal oxide. 4. An acid.
5. A nonmetal oxide. 6. A salt.
7. An acid. 8. A base.
9. A nonmetal oxide. 10. A salt.
11. An acid. 12. A salt.

16 1. *Look at the main book on page (54).*

2.

P.O.C.	Carbonate group	Bicarbonate group
- Chemical formula :	$(CO_3)^{-2}$	$(HCO_3)^-$
- Valency :	Divalent	Monovalent
- Number of atoms :	4 atoms	5 atoms

3.

P.O.C.	Potassium sulphate	Lead sulphate
- Chemical formula :	K_2SO_4	$PbSO_4$
- Solubility in water :	Soluble in water	Insoluble in water

4. *Look at the main book on page (54).*

17 Because rain water is dissolved in it acidic compounds, while the sea water is dissolved in it alkaline compounds.

18 1. H_2SO_4 2. KOH 3. K_2SO_4

19 1. Hexavalent (Nonmetal oxide).
2. Tetravalent (Nonmetal oxide).
3. Divalent (Salt). 4. Divalent (Acid).

20 1. It is a metal, because it contains one electron in its outermost energy level.
2. It is monovalent, because during chemical reaction, it loses one electron.
3. X_2O 4. X_2SO_4

21 1. Element (X) : 2 , 8 , 1
Element (Y) : 2 , 8 , 7
2. Element (X) is monovalent, because during chemical reaction, it loses one electron.
Element (Y) is monovalent, because during chemical reaction, it gains or shares with one electron.
3. Ionic compound (salt).

22 1.

Element	Electronic configuration K	L	M	N	Its type	Valency
$_9X$	2	7	–	–	Nonmetal	Monovalent
$_{13}Y$	2	8	3	–	Metal	Trivalent
$_7Z$	2	5	–	–	Nonmetal	Trivalent
$_{20}Q$	2	8	8	2	Metal	Divalent

2. a) Salt. b) Metal oxide , Y_2O_3
3. Ionic combination , QX_2

23 1. Monovalent. 2. Metal oxide.

24 ① 1. **Element (A)** is trivalent , because during chemical reaction, it loses three electrons.
Element (B) is divalent , because during chemical reaction, it gains or shares with two electrons.
2. Aluminium oxide (Al_2O_3)

② 1. (C) 2. (B) 3. (D) 4. (E) 5. (A)

③ 1. (1) $Ca(NO_3)_2$ (2) NaOH
(3) H_2SO_4 (4) AgCl
2. (1) A salt (2) A base
(3) An acid (4) A salt
3. • In tube (2), the paper doesn't change.
• In tube (3), the paper changes into red.
4. The salt dissolves in water.
5. Ionic bond.

Thinking Skills Questions

1 1. a 2. a 3. b 4. b
5. c 6. c 7. d

2 1. divalent – 4 2. $M(NO_3)_2 - M_3(PO_4)_2$

3 1. a. 12 b. 24 c. divalent.
2. XO

4 1. 12 – divalent.
2. positive ion – it carries two positive charges.
3. Ionic bond.
4. (1) d (2) c

5 1. 13 - trivalent. 2. Ionic bond.
3. Salt. 4. $X(OH)_3$

Lesson 3

1 1. c 2. b 3. c 4. d
5. c 6. d 7. d 8. c
9. c 10. d 11. b 12. c
13. a 14. d 15. c 16. c

2 (1) 1. b 2. d 3. a 4. c
(2) 1. d 2. a 3. b 4. c

3 1. (✗) ...... a white powder ......
2. (✓) 3. (✓)
4. (✗) ...... between metal and nonmetal ......
5. (✓) 6. (✓)
7. (✗) Carbon dioxide ......
8. (✗) ...... increases.
9. (✗) Nitrogen oxides ......
10. (✓) 11. (✓)
12. (✓) 13. (✗) ...... lightning.

4 1. Chemical reaction. 2. Chemical equation.
3. Law of conservation of matter.
4. Law of constant ratios.
5. Direct combination reactions.
6. Ammonium chloride. 7. Carbon dioxide.
8. Sulphur oxides. 9. Nitrogen oxides.

5 1. breaking – forming
2. (a) double covalent – two oxygen atoms.
(b) oxygen – magnesium oxide
3. symbols – chemical formulae – products
4. balanced – conservation of matter.
5. 80 – magnesium oxide.
6. constant ratios.
7. carbon dioxide – direct combination
8. white – ammonium chloride
9. medicines – fertilizers – plastics.
10. Carbon oxides – sulphur oxides – nitrogen oxides
11. carbon dioxide
12. headache – stomach-aches – fainting.
13. sulphur dioxide – sulphur trioxide – corrosion.
14. carbon monoxide – carbon dioxide
15. air – lung cancer.
16. Nitrogen – sulphur
17. Nitrogen – acidic

6 1. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
(Direct combination between a metal and a nonmetal).
2. $C + O_2 \xrightarrow{\Delta} CO_2$
(Direct combination between two nonmetals).
3. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
(Direct combination between two compounds).
4. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$
(Direct combination between an element and a compound).
5. $2NO + O_2 \longrightarrow 2NO_2$
(Direct combination between an element and a compound).

7 1. Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium.
2. To achieve the law of conservation of matter (mass).
3. Because it combines with oxygen forming magnesium oxide. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
4. Due to the formation of ammonium chloride as white clouds. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
5. Because through which, it is possible to :
- Obtain electric and heat energies used in some industries.
- Obtain more useful substances from less used substances.
- Prepare thousands of compounds are commonly used in many industries such as : manufacture of medicines, fertilizers, fuel, plastics, car batteries and food industries.
6. Because some of them play a vital role in our life, while others have negative effects on both human beings and environment.
7. Because it produces a lot of harmful gases that affect on humans and environment such as carbon, sulphur and nitrogen oxides.
8. Because it prevents the penetration of thermal rays produced from the Earth to outer space.
9. Because it causes lung cancer.
10. Because its burning causes air pollution with poisonous substances that infect humans with lung cancer.
11. Because it causes air pollution and lung cancer.
12. Because it causes headache, fainting, severe stomach-aches and may lead to death.
13. Because they are acidic gases.
14. Because they are poisonous acidic gases.

8 1. $2Al + 3Cl_2 \longrightarrow 2AlCl_3$
2. $2H_2 + 2NO \longrightarrow 2H_2O + N_2$
3. $2Na + Cl_2 \longrightarrow 2NaCl$
4. $2KI + Cl_2 \longrightarrow 2KCl + I_2$
5. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$

9 1. It is the breaking of the existing bonds between the atoms of the molecules in reactants and forming new bonds between the atoms of the molecules in the products.
2. It is a set of symbols and chemical formulae representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction as well.
3. It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.
4. The sum of reactants masses in any chemical reaction equals the sum of products masses.
5. The chemical compound is formed from combination of its elements by constant weight ratios.
6. They are the reactions which involve a combination of two or more substances to form a new compound.

10 1. The produced substances from burning of coal and cellulose fibres.
2. Carbon monoxide. 3. Sulphur oxides.
4. Nitrogen oxides.

11 1. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
(Direct combination between two elements a metal and a nonmetal).
2. $C + O_2 \xrightarrow{\Delta} CO_2$
(Direct combination between two nonmetals).
3. $NH_3 + HCl \xrightarrow{Conc.} NH_4Cl$
(Direct combination between two compounds).
4. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$
(Direct combination between an element and a compound)

12 1. A white powder of magnesium oxide is formed.
$2Mg + O_2 \xrightarrow{\Delta} 2MgO$ (white powder)
2. White clouds of ammonium chloride are formed.
$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$ (white clouds)
3. Carbon dioxide compound is formed.
$C + O_2 \xrightarrow{\Delta} CO_2$
4. The temperature of air increases as CO_2 causes the greenhouse effect.
5. It causes air pollution and lung cancer.

13 *Look at the main book on pages (84 & 85).*

14 *Answer by yourself.*

15 ① *Look at the main book on page (84).*
② - Mass of reactants = 12 + (2 × 16) = 44 gm.
- Mass of products = 12 + (2 × 16) = 44 gm.
③ (1) Mass of reactants = 1 + 35.5 + 23 + 16 + 1 = 76.5 gm.
Mass of products = 23 + 35.5 + (2 × 1) + 16 = 76.5 gm.
(2) Mass of reactants = 32 + (2 × 16) = 64 gm.
Mass of products = 32 + (2 × 16) = 64 gm.
④ (1) $C + O_2 \xrightarrow{\Delta} CO_2$
12 + (2 × 16)   12 + (2 × 16)
* The sum of reactants masses = 12 + 32 = 44 gm.
* The sum of products masses = 12 + 32 = 44 gm.
∴ The sum of reactants masses = The sum of products masses which achieves the law of conservation of matter.
Law of conservation of matter : The sum of reactants masses in any chemical reaction equals the sum of products masses.
(2) *Look at the main book on page (85).*
(3) a. Nonmetal oxide.
b. Covalent bond.
c. Direct combination reaction (between two elements a metal and a nonmetal).
⑤ (1) $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
(2) $C + O_2 \xrightarrow{\Delta} CO_2$
(3) $NH_3 + HCl \xrightarrow{Conc.} NH_4Cl$
⑥ *Look at the main book on pages (83, 84 & 85).*
⑦ According to the law of conservation of matter :
The mass of [Calcium hydroxide + Nitric acid] = The mass of [Calcium nitrate + Water]
∴ The mass of calcium nitrate = The mass of [Calcium hydroxide + Nitric acid] – The mass of water.
= [74 + 126] – 36
= 200 – 36
= 164 gm.

16 ① a - • **Fig. (1) :** Direct combination reaction between a metal element with a nonmetal element.

$$2Mg + O_2 \xrightarrow{\Delta} 2MgO$$

• **Fig. (2) :** Direct combination reaction between two nonmetal elements.

$$C + O_2 \xrightarrow{\Delta} CO_2$$

b - • **Fig. (1) :** Metal oxide.

• **Fig. (2) :** Nonmetal oxide.

c -

Properties of magnesium ribbon	Properties of coal
– It has metallic luster. – It is malleable and ductile.	– It has no luster. – It is not malleable or ductile.

② a - White clouds are formed at the mouth of the tube.

b - Direct combination between a compound with another compound.

$$NH_3 + HCl \xrightarrow{Conc.} NH_4Cl$$

c - Ammonium chloride – Salt.

Thinking Skills Questions

1 1. b 2. c 3. a

2 1. Because they affected by acidic sulphur oxides produced from fuel burning.
2. To prevent corrosion of monuments by acidic sulphur oxides produced from fuel burning.
3. Due to increase the ratio of carbon monoxide in air from the burning of the fuel of car.

3 $2Mg + O_2 \xrightarrow{\Delta} 2MgO$

48 gm ⟶ 80 gm

? gm ⟶ 10 gm

∴ Mass of magnesium reactant $= \frac{10 \times 48}{80} = 6$ gm

4 1. a

2. NaOH ⟶ NaCl

(23 + 16 + 1) ⟶ (23 + 35.5)

40 gm ⟶ 58.5 gm

80 gm ⟶ ? gm

∴ Mass of produced sodium chloride

$= \frac{58.5 \times 80}{40} = 117$ gm.

Project On UNIT One *Answer by Yourself*

Unit Two

Lesson 1

1

1. b	2. d	3. d	4. b
5. b	6. b	7. b	8. b
9. b	10. c	11. c	12. d
13. c	14. c	15. c	16. b
17. b	18. c	19. b	20. c
21. c	22. c	23. b	24. b
25. d	26. c		

2 1. (✗) ...... change its state and its direction.
2. (✓) 3. (✗) ...... into three main kinds.
4. (✗) Weight is ......
5. (✗) ...... increases by ....
6. (✓)
7. (✗) ...... decreases ......
8. (✗) The scientist Newton ......
9. (✓)
10. (✗) ...... is equal to ......
11. (✓) 12. (✓)
13. (✗) ...... = its mass × gravity acceleration.
14. (✗) ...... is more than ......
15. (✓) 16. (✓)
17. (✗) ...... of wrought iron.
18. (✗) ...... changes the mechanical (kinetic) energy into electric energy.
19. (✗) Electric motor ......
20. (✗) ...... in generating electric energy.
21. (✗) ...... in producing electricity.

3 1. Force. 2. Object's weight.
3. Centre of gravity.
4. Newton. 5. Object's weight.
6. Electromagnet.
7. Electric generator (Dynamo).
8. Electric motor. 9. Weak nuclear forces.

4 1. force 2. force – motion.
3. direction 4. motion – direction
5. gravitational – electromagnetic – nuclear
6. increases
7. centre – weight.
8. weight – centre of gravity.

9. its weight – its mass
10. Object mass – Earth's gravity acceleration
11. kilogram – newton.
12. mass – changes
13. Object's mass. 14. newton
15. decreases. 16. 30 newton.
17. copper – wrought iron.
18. electric – magnetic
19. electric winches – electric bells.
20. mechanical – electric
21. electric – mechanical
22. nucleus.
23. medicine – scientific researches
24. electric energy – military
25. nuclear

5 1. Because there is no force acts on it.
2. Because the object changes its state when a proper force acts on it.
3. Because the force acting on the wall is improper.
4. Because the mass of the object is the amount of matter that the object contains, and it doesn't change by changing the position.
5. Because the amount of 1 kg represents the mass of a bag of sugar and not its weight.
6. Because the weight equals multiplying the mass of the object by Earth's gravitational acceleration.
7. Because Earth's gravitational acceleration changes from one place to another.
8. Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to the non-spherical shape of the Earth.
9. Because the Earth's gravitational acceleration at the south pole is greater than the Earth's gravitational acceleration at the equator.
10. Because it is changed into a temporary magnet.
11. Because it is used in generating of electric energy from mechanical energy.
12. Because it changes electric energy into mechanical energy.
13. Because it is used in medicine, industry and producing electricity.

6 1. It is an effect attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.
2. It is the ability of the Earth to attract that object to its centre.
3. This means that the amount of Earth's gravitational to this object is 60 newton.
4. This means that the Earth's gravitational acceleration in this region is 9.8 m/sec².

7 1. Gravitational forces.
2. Electromagnetic force.
3. Electromagnetic force.
4. Weak nuclear forces.
5. Strong nuclear forces.

8 1. It changes the electric energy into magnetic energy.
2. It changes the mechanical (kinetic) energy into electric energy.
3. It changes the electric energy into mechanical (kinetic) energy.

9 1. It is used in making of electric bells and electric winches.
2. They are used to lift scrap iron and cars in ports.
3. It converts the electric energy into mechanical energy.
4. It is used to get radioactive elements and radiations used in medicine.
5. It is used in producing electricity.

10 1. It will move, because there is a force acting on it.
2. It will change its direction, because the force acting on it can change the ball direction.
3. It doesn't move, because the force acting on it is improper.
4. The object's weight increases, because object's weight = object's mass × Earth's gravitational acceleration and there is a direct relation between them.
5. The mass of the bird remains fixed, while the weight of the bird decreases, because the value of Earth's gravitational acceleration at the equator is less than that at the south pole.
6. The Earth's gravitational acceleration increases, because Earth's gravitational acceleration increases by approaching to the Earth's centre.
7. The weight of the object decreases, while its mass remains constant, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.

8. The mass of the astronaut remains constant, while his weight is changed, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.
9. The iron bar will attract the iron filings, because the iron bar is changed into a temporary magnet.
10. Falling the pieces of iron, because the electromagnet loses its magnetic force.

11

Odd word	Scientific name of the rest
1. Friction forces	Fundamental forces in nature.
2. Work	Weight = Mass × Earth's gravitational acceleration.
3. Bell handwork	Applications on electromagnetic forces.

12 1.

Mass	Weight
It is the amount of matter that the body contains.	It is the amount of Earth's gravitational to an object.
It is a fixed value.	It changes from a place to another on the Earth's surface.
Its measuring unit is (kg).	Its measuring unit is (newton).
Mass = $\frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$	Weight = Mass × Earth's gravitational acceleration.

2.

Electric generator	Electric motor
It changes mechanical energy into electric energy.	It changes electric energy into mechanical energy.

3.

Strong nuclear forces	Weak nuclear forces
They are used in producing electricity and in military purposes.	They are used in : • medicine. • scientific researches. • industry.

13 1. *Look at the main book on page (100).*
2. *Look at the main book on page (105).*

14 1. The weight of the object
= Object's mass × Earth's gravitational acceleration
a. The weight of the ball
= 0.3 × 9.8 = 2.94 newton.
b. The weight of the boy
= 50 × 9.8 = 490 newton.

2. Mass = $\frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$
$= \frac{980}{9.8} = 100$ kg.

3. a. Object's weight is equal to the Earth's gravitational force to this object
= 34.3 newton.
b. Object's mass
$= \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$
$= \frac{34.3}{9.8} = 3.5$ kg.

4. Object's mass = $\frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$
$= \frac{80}{10} = 8$ kg.
Gravitational acceleration on Mars = $\frac{\text{Weight}}{\text{Mass}} = \frac{32}{8}$
= 4 m/sec^2

15 ① • Lightning and thunder. • Wind motion.
• The gravitational of objects to Earth.
② • Gravitational forces.
• Electromagnetic forces. • Nuclear forces.
③ • Object's mass.
• Earth's gravitational acceleration.
④ Weight = Mass × Earth's gravitational acceleration.
⑤ (1) The mass of the object at the south pole is equal to its mass at the equator.
(2) The value of Earth's gravitational acceleration at the equator is less than that its value at the south pole.
⑥ • The electromagnet is made up of an isolated copper wire coiling around a bar of wrought iron.
• It is used in making of electric winches and electric bells.
⑦ Electromagnet.
⑧ • Weak nuclear forces are used in medicine, scientific researches and industry.
• Strong nuclear forces are used in producing electricity and in military purposes.
⑨ The iron nail is changed into a temporary magnet due to flowing of an electric current through the wire.
⑩

Input energy	Output energy
(1) Electric energy. (2) Mechanical energy.	(1) Mechanical energy. (2) Electric energy.

⑪ (1) Due to the change of the value of Earth's gravitational acceleration.
(2) The weight increases, because the value of the Earth's gravitational acceleration at the north pole [point (B)] is more than its value at the equator [point (A)].

Thinking Skills Questions

1 1. c 2. c

2 1. The mass of object (B) = $\frac{400}{10}$ = 40 kg.
∵ The mass of object (A) is doubled the mass of object (B)
∴ The mass of object (A) = 2 × 40 = 80 kg.
2. Gravitational acceleration = $\frac{\text{Weight}}{\text{Mass}}$
∵ The mass of the object doesn't change from a place to another.
∴ $\frac{\text{Gravitational acceleration on Moon's surface}}{\text{Gravitational acceleration on Earth's surface}}$
$= \frac{\text{Object's weight on Moon's surface}}{\text{Object's weight on Earth's surface}} = \frac{6}{36} = \frac{1}{6}$
3. (1) The object's weight on Earth's surface
= 30 × 9.8 = 294 newton.
(2) The object's weight on Moon's surface
$= 30 \times (\frac{1}{6} \times 9.8) = 49$ newton.
4. Gravitational acceleration on the surface of Uranus planet = $\frac{200}{26}$ = 7.7 m/sec^2.
5. - The weight of the rocket before shooting
= 100 × 10 = 1000 N.
- The weight of the rocket after shooting
$= (\frac{3}{4} \times 100 \times 10) = 750$ N.
∴ The weight of the rocket before shooting is more than its weight after shooting.

Lesson 2

1

1. b	2. c	3. a	4. b	5. a
6. c	7. d	8. c	9. c	10. b
11. b	12. c	13. a	14. c	15. c
16. d	17. d	18. d	19. a	20. b
21. c	22. b			

2 1. d 2. b 3. a

3 1. (✗) ...... is 50 km/hour.
2. (✗) ...... rushed forward ......
3. (✗) Inertia ......
4. (✗) ...... on stopping the forces of inertia.
5. (✗) ...... due to friction.
6. (✓) 7. (✓)
8. (✗) ...... loss of mechanical energy ......
9. (✗) ...... very coarse substance ......
10. (✗) ...... decrease friction.
11. (✓) 12. (✓) 13. (✓)
14. (✓) 15. (✓) 16. (✓)
17. (✗) ...... from the lower concentration to the higher one.

4 1. Inertia. 2. Safety belt.
3. Friction forces. 4. Friction forces.
5. Forces inside living systems (Biological forces).

5 1. Force of inertia – friction forces
2. rushed forward – inertia. 3. rushed back
4. rushed forward – fall down
5. speed – inertia.
6. safety belts – inertia. 7. Friction
8. Friction – walking. 9. mechanical – heat
10. friction – erosion.
11. Preventing feet from slipping on roads during walking – helping in stopping and starting cars motion
12. simple – complex
13. contraction – relaxation
14. lower – higher 15. relaxation – move.

6 1. Due to inertia, as they try to maintain their state of motion.
2. Due to inertia, as they try to maintain their state of rest.
3. Due to inertia, as he tries to maintain his state of motion.
4. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.
5. Due to inertia, as its arms try to maintain its state of motion.
6. Because the friction between the tyre of the bicycle and the brakes generates a friction force against motion of the bicycle which leads to resist it.
7. To increase friction to control the motion.
8. Because some mechanical energy is transferred into heat energy due to friction.

9. Because friction with grass is more than friction with ice, so the motion is more controlled.
10. To increase friction between tyres and the road to help car in starting and stopping motion.
11. To decrease friction between moving parts of machines and prevent their erosion.
12. Because friction forces generate heat energy leads to ignition of match.
13. Because the oil stains decrease the friction forces, so the driver can't control the vehicle.
14. Because friction forces have benefits and also they have harms.
15. Due to heart muscle contraction and relaxation.

7
1. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
2. It is a resistant force (against motion) originated between the object in motion and the medium touching it.
3. They are forces that enable living organisms to do their different biological operations.

8
1. Forces of inertia.
2. Friction forces.
3. Forces inside living systems.
4. Forces inside living systems.

9
1. The driver and passengers will be rushed forward.
2. The driver and passengers will be rushed backward.
3. The coin will fall in the cup.
4. The passengers may be injured.
5. The bike slows down due to the friction force between the brakes and the tyres of the bike.
6. Parts of machines getting hot and erosion occurs.
7. Their temperature will increase.
8. Movement of all body organs.
9. Stopping the pulse.

10
① *Look at the main book on page (120).*
② *Look at the main book on page (119).*
③ *Look at the main book on page (122).*
④ *Answer by yourself.*
⑤ • When the land is wet, the friction between my shoes and ground is small and this causes slipping of feet on roads.
• When the land is dry, the friction increases and this prevents feet from slipping on roads during walking.
⑥ *Look at the main book on page (123).*
⑦ Because the force of inertia makes the coin resists the sudden movement of the paper to maintain the state of rest.
We conclude that the force of inertia makes objects resist the change of their state unless an external force acted on them.
⑧ (1) Adel's car.
(2) Due to the friction forces.
(3) It will move more slowly on the plane covered with sand because friction will increase.
⑨ (1) less (2) less (3) decreases

11
1. Because the friction force > the pulling force.
2. Because friction force doesn't cause motion, but it originates due to motion.

Thinking Skills Questions

1 1. a 2. c

2
1. Because friction force between the boat and the sand is more than friction force between the boat and water.
2. Due to friction force between the outer surface of the spaceship body and the air of the atmosphere.
3. To absorb the heat energy produced due to friction even the tire of lathe toothed doesn't expand.

3
1. a
2. • Solution (A), its concentration 40 %
• Solution (B), its concentration 10 %
Because liquids transport from lower concentration to higher one.
3. The intestine is shrinking because the liquid transports from the intestine to the solution.
4. Forces inside living systems.

Lesson 3

1

1. c	2. a	3. c	4. b	5. b
6. a	7. b	8. c	9. d	10. b
11. d	12. a	13. c	14. a	15. a
16. c	17. d	18. b	19. b	20. b
21. a	22. c	23. d	24. b	25. a
26. d	27. c	28. a	29. d	

2 1. b 2. a 3. d 4. c 5. e

3
1. (✗) ····· backward. 2. (✓)
3. (✗) ····· a transitional motion.
4. (✓)
5. (✗) ····· periodic motion and transitional motion.
6. (✗) Transitional motion is ·····
7. (✗) ····· a vibrating motion.
8. (✓) 9. (✓) 10. (✓)
11. (✗) ····· mechanical waves.
12. (✓)
13. (✗) ····· by electromagnetic forces.
14. (✗) Ultrasonic waves ·····
15. (✗) ····· as flute and reed pipe.
16. (✗) Infrared rays ·····
17. (✗) Infrared rays ......
18. (✗) Ultraviolet rays ......
19. (✗) X-rays are ...... 20. (✓) 21. (✓)
22. (✗) We use visible light in ......

4
1. Speed. 2. Relative motion.
3. The reference point. 4. Transitional motion.
5. Periodic motion.
6. Vibrating motion. 7. Circular motion.
8. Wave motion. 9. Mechanical waves.
10. Mechanical waves.
11. Electromagnetic waves.
12. Electromagnetic waves.
13. Infrared rays.

5
1. position – direction – frame of reference.
2. stop
3. backward.
4. transitional – periodic
5. position – initial – final
6. periodic – transitional
7. initial – final – repeat
8. Periodic – equal
9. Circular – vibrating – wave motions
10. vibrating – wave – periodic
11. mechanical – electromagnetic
12. water – mechanical
13. free space – medium
14. vibration – particles.
15. medium – free space.
16. mechanical – electromagnetic
17. electromagnetic
18. Ultraviolet – infrared
19. Radio waves – X-rays – gamma rays
20. mechanical – electromagnetic
21. less
22. free space – 300 millions
23. stringed – flute – pneumatic
24. Infrared – visible light
25. Ultraviolet – gamma
26. Infrared – heat
27. Photographing bones – examining mineral raws
28. photography – light shows.
29. Infrared

6
1. Because the trees and buildings appear moving by the same speed of the car but in the opposite direction.
2. Because the train position is changed relative to a fixed point from time to time between initial and final positions.
3. Because it is a motion which is regularly repeated in equal periods of time.
4. Because transitional motion has initial and final points and it doesn't repeat its motion.
5. Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.
6. Because sound is mechanical waves which can't travel through free space.
7. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
8. Because sound is from mechanical waves, while light is from electromagnetic waves.
9. Because they are produced due to the vibration of medium particles.
10. Because remote sets work by infrared rays (electromagnetic waves) which can travel through space.
11. Because they have heat effect property.

12. Because they detect the bone fractures.
13. To show errors, pores and cracks in these minerals.
14. Because they are used to treat and discover some swellings (tumors).
15. To be sterilized before reuse.

7
1. It is the distance covered by an object in a unit time.
2. It is the change in an object's position or direction as the time passes relative to another object or a fixed point known as frame of reference.
3. They are waves that need a medium to transfer through.
4. They are waves accompanied by electromagnetic forces and they don't need a medium to travel through.
5. It is a motion which is regularly repeated in equal periods of time.
6. It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final positions.

8
1. Both of them seem to be at rest to each other.
2. You will imagine that your car moves forward.
3. You will imagine that your car moves backward.

9
1. A car moves relative to a tree.
2. The motion of a bicycle or a car or a train.
3. The vibration of a pendulum.
4. The movement of the Moon around the Earth.
5. Water waves.
6. Sound waves or water waves.
7. Visible light.
8. Infrared or ultraviolet rays.
9. Lute or guitar. 10. Flute or reed pipe.
11. Infrared rays.

10
1. A simple pendulum motion.
   All are transitional motion except this is a periodic motion.
2. The movement of a piece of cork on the surface of shaking water.
   All others are examples of circular motion.
3. Transitional motion.
   All others are periodic motion.
4. Water waves.
   All are electromagnetic waves except water waves which are mechanical waves.
5. Light waves.
   All are mechanical waves except light waves which are electromagnetic waves.

11
1. Gamma rays or X-rays. 2. Ultrasonic waves.
3. Infrared rays. 4. Infrared rays.
5. Infrared rays. 6. Ultraviolet rays.
7. X-rays. 8. X-rays.
9. Gamma rays. 10. Visible light.
11. Visible light.

12
1. Examining and curing sets for human body.
2. Cooking food.
3. Sterilizing the sets of surgical operations rooms.
4. Photographing bones.
5. In medical purposes, as the treatment and discovering of some swellings.
6. In photographic cameras.

13
1. ***Look at the main book on page (134).***
2. ***Look at the main book on page (135).***
3.

Train motion	Fan arms motion
A transitional motion.	A circular periodic motion.

4.

Simple pendulum motion	Water waves motion
A vibrating periodic motion.	A wave periodic motion.

14
① • Motion of a bicycle. • Motion of a car.
  • Motion of a train.
② • Motion of vibrating pendulum.
  • Movement of the Moon around the Earth.
  • Motion of water waves.
③ Mechanical waves :
  • Sound awaves. • Water waves.
  Electromagnetic waves :
  • Visible light. • Gamma rays.
④ Infrared rays – X-rays – Visible light.

15
- (1), (5) & (7) : Circular periodic motion.
- (2), (4) & (8) : Transitional motion.
- (3) & (9) : Vibrating periodic motion.
- (6) : Wave periodic motion.

Thinking Skills Questions

1
a. Transitional motion, because it has initial and final points.
b. Periodic motion, because it repeats its motion in equal periods of time.

2 Because the speed of radio waves (electromagnetic waves) is greater than the speed of sound waves (mechanical waves).

3
1. The car seems to be static.
2. The static car seems to be moving at the same speed, but in the opposite direction.
3. The other car seems to be moving at a high speed.
4. The train moves a transitional motion.
5. The sunflower plant moves in a periodic motion.

Project On UNIT Two *Answer by Yourself*

Unit Three

Lesson 1

1

1. a	2. d	3. b	4. c	5. c
6. d	7. b	8. b	9. c	10. d
11. b	12. c	13. b	14. b	15. a
16. b	17. a	18. c	19. c	20. d
21. a	22. a	23. b	24. b	25. b
26. d	27. c	28. d	29. b	30. b
31. d	32. c	33. b	34. b	35. a
36. b	37. c	38. b	39. d	40. d
41. b	42. b			

2
(A) **1.** 1. b 2. a 3. d 4. c
2. 1. e 2. f 3. b 4. g
5. a 6. d
(B) 1. b - A 2. a - D 3. c - E 4. d - C

3
1. (✓) 2. (✓)
3. (✗) ...... spiral arms.
4. (✗) ...... telescopes ......
5. (✗) ...... our star ......
6. (✗) ...... spherical opaque ......
7. (✓) 8. (✗) ...... and Mars.
9. (✗) ...... between 3.3 to 5.5 gm/cm^3.
10. (✓) 11. (✓) 12. (✓) 13. (✓)
14. (✗) ...... the second ......
15. (✓) 16. (✗) The inner planets ......
17. (✓) 18. (✗) ...... is 11.00 m/sec^2.
19. (✓) 20. (✗) ...... on Jupiter ......
21. (✗) ...... and Mars.
22. (✗) Meteors ......
23. (✗) ...... in elongated elliptical orbits.
24. (✗) Comets ......
25. (✗) ...... 76 years. 26. (✓)

4
1. Celestial body. 2. Stars.
3. Light year. 4. Galaxy.
5. Milky Way galaxy. 6. Planets.
7. The Sun. 8. Inner planets.
9. Outer (giant) planets. 10. Mercury.
11. Mercury and Venus. 12. Earth.
13. Jupiter. 14. Mars.
15. Moons. 16. Asteroids.
17. Asteroids' belt. 18. Meteors.
19. Meteorites. 20. Comets.
21. Halley's comet.

5 1. celestial body. 2. Stars 3. light year.
4. Milky Way – Chopped Hay.
5. reflecting – refracting
6. celestial bodies. 7. Sun.
8. the Sun – planets – asteroids – meteorites
9. eight.
10. elliptical (oval) – perpendicular
11. inner – outer
12. Mercury – Venus – Mars – Uranus
13. Mercury – Neptune. 14. Jupiter – Earth.
15. Venus – Mars – Uranus 16. small – giant
17. Venus – Earth 18. Mercury – Venus
19. Mercury 20. hydrogen – helium
21. mass of each object – distance between them.
22. Jupiter – Mars 23. Uranus – Neptune
24. 62 – 2 25. Earth.
26. rocky masses – Sun 27. Mars – Jupiter
28. meteors – meteorites. 29. head – tail.
30. nitrogen – methane
31. more elongated elliptical
32. Halley – 76

6 1. Because they are far from us.
2. Because these distances are too huge to be measured by kilometres.
3. Due to the attraction force of the Sun to the planets.
4. Because they are the nearest four planets to the Sun.
5. Because they consist of solid bodies.
6. Because they are the farthest four planets from the Sun.
7. Because they consist mainly of gaseous bodies.
8. Due to the high pressure and extreme coldness on the surfaces of these planets.
9. Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.
10. Due to the difference in the gravity acceleration from a planet to another.
11. Because they rotate around the planets and they are affected by their gravity.
12. Due to the burning of small rocky masses when they penetrate the Earth's atmosphere as a result of heat produced from their friction with air forming meteors.
13. Because it completes its revolution around the Sun every 76 years.

7

Odd word	Scientific name
1. Mercury.	Inner planets surrounded by an atmosphere.
2. The Sun.	Planets.
3. Saturn.	Inner planets.
4. Venus.	Outer planets.
5. Halley.	Planets.
6. Earthquakes	Celestial bodies.

8 1. Light year.
2. Number of planets in the solar system.
3. Number of inner or outer planets.
4. The range of densities of inner planets.
5. The range of densities of outer planets.
6. Number of moons rotating around Saturn planet.
7. The moon which rotates around the Earth.
8. Number of moons of inner planets group.
9. Number of moons rotating around Uranus planet.
10. Number of moons rotating around Jupiter planet.
11. Acceleration due to gravity on the Earth.
12. Acceleration due to gravity on Jupiter.
13. The mass of the biggest meteorite.
14. The time of revolution of Halley's comet around the Sun.

9 1. Any body swims in the space such as stars, planets, moons and rocky or gaseous bodies.
2. They are big-sized bodies that emit enormous amounts of heat and light.
3. It is the distance covered by light in one year and it equals 9.467×10^{12} km.
4. This means that the distance between two stars $= 2 \times 9.467 \times 10^{12} = 18.934 \times 10^{12}$ km.
5. They are the greatest units that form the universe.
6. They are eight spherical opaque bodies revolve around the Sun in elliptical paths.
7. They are four small rocky planets nearest to the Sun.
8. They are four giant gaseous planets farthest from the Sun.
9. They are followers that are affected by the gravity of the planets that rotate around them.
10. They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.

11. It is a region that separates the group of the inner planets from the group of the outer planets.
12. They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
13. They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.
14. They are masses of rocks, ice and solidified gases that revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.

10 1. Stars will be seen as light small points.
2. We can't discover the celestial bodies.
3. It becomes hotter.
4. The effect of gravity force decreases.
5. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
6. Its outer surface burns only and the remaining part of it without burning falls on the Earth's surface.

11 1.

Stars	Planets	Moons
They are big-sized bodies emit enormous amounts of heat and light.	They are spherical opaque bodies revolve around the Sun in elliptical paths.	They are followers (small space bodies) that are affected by the gravity of the planets that rotate around them.

2. *Look at the main book on page (158).*

3.

P.O.C.	Jupiter planet	Mars planet
The distance from the Sun :	It occupies the fifth order.	It occupies the fourth order.
The number of moons rotating around it :	62	2

4. *Look at the main book on pages (161 & 162).*
5. *Look at the main book on pages (156 & 161).*
6. *Look at the main book on page (161).*

12 1. Distance in km $= 6 \times 9.467 \times 10^{12}$
$= 56.802 \times 10^{12}$ km.

2. Distance in light year $= \frac{28.401 \times 10^{12}}{9.467 \times 10^{12}}$
= 3 light years.

13 ① 1. **Their distances from the Sun :**
Mercury – Venus – Earth – Mars – Jupiter – Saturn – Uranus – Neptune.
2. **The acceleration due to gravity on their surfaces :** Mars – Mercury – Uranus – Venus – Saturn – Earth – Neptune – Jupiter.
② Identifying the celestial bodies – Reflecting and refracting telescopes.
③ 1. Milky Way galaxy.
2. Oval shape with coiled spiral arms.
3. On one of its arms.
④ The Sun – 8 planets.
⑤ Mass of each object and the distance between them.
⑥ 1. 1986 – 76 = 1910 2. 1986 + 76 = 2062
⑦ Yes, because the acceleration due to gravity on the surface of planet Mars is less than that on the surface of planet Earth.

14 ① 1. the planet. 2. the Sun.
3. the gravitational force. 4. the orbit.
② 1. Fig. (A) : Refracting telescope.
Fig. (B) : Reflecting telescope.
2. They are used in identifying the celestial bodies.
③ 1. Milky Way galaxy.
2. It consists of a tremendous collection of stars.
3. the position of the Sun.
④ 1. Comet.
2. ① The head. ② The tail.

Thinking Skills Questions

1 1. (A). b (B). d 2. a

2 (A) 1. (1) Saturn. (2) Neptune. (3) Uranus.
2. (2)
(B) 1. Path of the planet (orbit) – Semi-circular or oval.
2. Moon.

3. A ⟶ B ⟶ D ⟶ C
The effective factor : the distance between the Sun and the planet.

3 (a)

4 The planets will leave their orbits and float in a random fashion in space and therefore there will not be solar system.

5 – The first monitoring for Halley's comet in 1682
– The second monitoring for Halley's comet in 1758, i.e after 76 years from the first monitoring, so the scientist Halley doesn't see it, because he died in 1743.

6

The solar system	The oxygen atom
• The Sun is the centre of the solar system and most of the mass of the solar system is concentrated in the Sun.	• The nucleus is the centre of the atom and most of the mass of the atom is concentrated in its nucleus.
• Planets revolve around the Sun in fixed orbits.	• Electrons revolve around the nucleus in fixed orbits (energy levels).
• There are 8 planets revolve around the Sun.	• There are 8 electrons revolve around the nucleus.

Lesson 2

1 1. b 2. a 3. a 4. b 5. d 6. d
7. c 8. d 9. b 10. c 11. d 12. d
13. c 14. b 15. d 16. b 17. b 18. c
19. c 20. c 21. a 22. c 23. c 24. c
25. d 26. b 27. a

2 (A) 1. c 2. a 3. d 4. b
(B) 1. d 2. c 3. a 4. e
(C) 1. d 2. e 3. a 4. c

3 1. (✓)
2. (✗) ...... at the equator is ...... between the two poles.
3. (✓) 4. (✓) 5. (✓)
6. (✗) ...... is a mixture of ...... with different ratios.
7. (✗) ...... of carbon dioxide ......
8. (✗) Nitrogen gas ...... of oxygen gas ......
9. (✗) ...... decreases ......
10. (✗) ...... is less than the percentage of nitrogen gas and is more than ......
11. (✓) 12. (✗) Nitrogen gas ......
13. (✗) ...... ultraviolet rays.
14. (✗) ...... 71 % of ......
15. (✗) The green colour ......
16. (✗) ...... 97 % ......
17. (✗) The water of rivers is ...... 18. (✓)
19. (✗) ...... due to the gravity. 20. (✓)
21. (✓) 22. (✗) ...... the Earth's crust.
23. (✓) 24. (✗) ...... the Earth's crust.
25. (✓) 26. (✓)

4 1. The Earth. 2. Atmosphere.
3. Oxygen. 4. Nitrogen.
5. Carbon dioxide.
6. Photosynthesis process.
7. Ozone layer. 8. Ground water.
9. Water. 10. Earth's crust.
11. Mantle. 12. Inner core.
13. Outer core.

5 1. gravity – 365.25 2. third – 150 million
3. a slight flattening – indented outward
4. tropical – polar 5. inner
6. 6386 km – 5.9 × 10^{24} kg.
7. Earth's atmosphere – Earth's hydrosphere
8. white 9. 0.03 % – 21 %
10. nitrogen – 78 % 11. carbon dioxide
12. Oxygen – nitrogen 13. Nitrogen
14. ozone
15. Wind movement – clouds formation
16. burning millions of small falling meteors – reducing the high speed of large meteorites.
17. 71 % – salty – fresh
18. Rivers – lakes – seas – oceans
19. pores and cracks
20. Water – temperature. 21. 76 cm.Hg.
22. mantle – core. 23. crust – mantle.
24. Earth's crust – Earth's core.
25. 8 – 60 km. 26. outer – inner
27. Iron - nickel

6 1. Because the Earth is slightly flattened at its poles and indented outward at the equator.
2. Because it is the biggest inner planet and it is smaller than any planet from the outer planets.
3. Due to the presence of the atmosphere that appears as a white colour around the Earth.
4. Because the expansion of atmosphere in space helps in burning millions of small falling meteors completely before reaching the Earth's surface.
5. Because it protects living organisms from the harmful ultraviolet radiations.
6. Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.
7. Due to the gravitational force of the Earth.
8. Due to the gravitational force of the Earth.
9. Due to :
– The presence of hydrosphere.
– The presence of the atmospheric envelope containing oxygen gas which is needed for life.
– Its temperature is suitable during both day and night.
– Its atmospheric pressure and its gravitational force are suitable.
10. The Earth has a force of gravity that makes the life possible through :
– Constancy and steadfastness of objects and living organisms on its surface.
– Steadfastness of the hydrosphere position on its surface.
– Keeping the Earth surrounded by the atmosphere.
11. As a result of the revolution of the Earth around its centre, the heavy metals descended towards the centre of the Earth and the light components in density ascended upwards, this led to the formation of a number of Earth's layers.
12. Due to the high temperature of Earth's core.
13. Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

7 1. 22 km. 2. 365.25 days.
3. 150 million km.
4. 6386 km approximately.
5. 5.9 × 10^{24} kg. 6. 78%
7. 21% 8. 0.03%
9. 71% 10. 97%
11. 3% 12. 76 cm.Hg.
13. 8 – 60 km approximately.
14. 2885 km approximately.
15. 2100 km approximately.
16. 1350 km approximately.
17. 3450 km approximately.

8 *1. 2. & 3. Look at the main book on page (178).*
4. & 5. Look at the main book on page (179).
6. It protects living organisms from the harmful ultraviolet rays.
7. & 8. Look at the main book on pages (180 & 181).
9. The temperature on Earth's surface is suitable for the continuation of the life of living organisms.

9 1. The combustion processes will be fast, and proceed without any control.
2. There is no life.
3. The ultraviolet rays will reach the Earth's surface and harm living organisms.
4. The Earth will not keep its atmosphere, the hydrosphere will not settle in its position and all objects on Earth's surface will move in a random way, that causes the difficulty in the continuity of life.

10 *1. & 2. Look at the main book on page (178).*
3. & 4. Look at the main book on page (180).
5. & 6. Look at the main book on page (182).

11 ① Earth :
1. **Shape** : It is a spherical object with a slight flattening at the two poles and indented outward at the equator.
2. **Volume** : It is the planet of the fourth order in volume.
3. **Mass** : 5.9 × 10^{24} kg.
4. The Earth completes one revolution around the Sun in 365.25 days.
② *Look at the main book on page (177).*
③ *Look at the main book on page (182).*
④ 1. Nitrogen – Oxygen – Water vapour and other gases – Carbon dioxide.
2. Inner core – Outer core – Lower mantle – Upper mantle – Crust.

12 ① 1. core. 2. mantle. 3. crust.
② 1. (1) Earth's crust. (2) Mantle.
(3) Outer core. (4) Inner core.
2. (3)
3. 2100 km approximately
– 1350 km approximately.
4. nickel – solid

Thinking Skills Questions

1 1. a 2. a 3. a

2 1. All living organisms will die, because oxygen gas is used in respiration process.
2. The air pressure will become unsuitable for the continuation of life.

3 1. • 78% nitrogen gas. • 21% oxygen gas.
• 0.03% carbon dioxide gas.
• 0.97% water vapour and other gases.
2. *Look at the main book on page (178).*

4 No, because the percentage of oxygen in its atmosphere is low, the percentage of carbon dioxide is very large, has no water and it will be exposed to harmful consmic radiation because its atmosphere does not contain the ozone layer.

Lesson 3

1

1. c	2. d	3. a	4. c	5. b
6. a	7. d	8. b	9. a	10. c
11. d	12. a	13. b	14. a	15. b
16. c	17. a	18. b	19. d	20. c
21. b	22. d	23. d	24. b	25. a

2 ① 1. b 2. c 3. a
② 1. c 2. d 3. a

3 1 - a - B 2 - d - C 3 - b - A

4
1. (✓)
2. (✗) ...... through the soil of the Earth's crust.
3. (✗) The rock consists of one mineral or a group of minerals.
4. (✗) ...... of volcano.
5. (✗) ...... form the plutonic rock ......
6. (✓) 7. (✗) ...... a type of igneous rocks.
8. (✓) 9. (✗) ...... an igneous rock.
10. (✓) 11. (✓) 12. (✓)
13. (✓) 14. (✗) ...... increases by ......
15. (✗) The lower ......
16. (✗) ...... in sandstone rock. 17. (✓)
18. (✗) ...... calcium carbonate ......
19. (✗) Carbon dioxide gas ...... 20. (✓)
21. (✗) Marble is an example of metamorphic rocks.
22. (✗) The white ......

5
1. Soil. 2. Rock.
3. Magma. 4. Lava.
5. Igneous rocks. 6. Volcanic igneous rock.
7. Plutonic igneous rocks.
8. Granite. 9. Basalt.
10. Sedimentary rocks.
11. Sandstone. 12. Limestone.
13. Metamorphic rocks.

6
1. soil – solid basis.
2. Soil – non-compacte
3. mineralogical substances – water – organic
4. igneous – sedimentary – metamorphic
5. the Earth's crust – magma – volcanic flows – lava.
6. plutonic rocks – volcanic rocks.
7. large – small 8. Granite – basalt
9. plutonic – volcanic 10. Granite – basalt
11. quartz – feldspar – mica – olivine – pyroxene – feldspar
12. 75% – 5%
13. erosion – transportation – deposition.
14. aqueous – aerial
15. Sandstone – limestone
16. white – smooth – yellow – coarse.
17. quartz
18. calcium carbonate – lime
19. Sandstone – 2 mm 20. hydrochloric
21. Calcite – $CaCO_3$ 22. carbon dioxide
23. igneous – sedimentary – metamorphic
24. mass – rock 25. limestone.

7
1. Because the upper part is fragmented and loosened layer but the lower part is a solid material that consists of different types of rocks.
2. Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize so, their crystals are large-sized.
3. Because the minerals that form it don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.
4. Due to the extruding of gases from volcanic flows during their cooling and formation of rock.
5. Because the size of crystals of minerals forming granite is large, while the size of crystals of minerals forming basalt is small.
6. Because it is a plutonic rock which has large crystals.
7. Because it is a volcanic rock which has very small crystals.
8. Due to the precipitation of calcium carbonate in lime solutions.
9. Due to evolving of carbon dioxide gas.
10. Because the sediments exist in the lower layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains.
11. Because sandstone is yellow in colour and its texture is coarse, while limestone is white in colour and its texture is smooth.
12. Because if it contains impurities, it is coloured and if it is pure, it is white.

8
1. It is extruded in the form of volcanic flows and it is called lava.
2. Volcanic igneous rocks are formed.
3. Plutonic igneous rocks are formed.
4. Their crystals become large-sized.
5. Their crystals become small-sized.
6. Small circular holes are formed inside the rocks.
7. Water takes the smooth sand in its way and the sand deposits at the lower part, while shingle and gravel remain at the upper part.
8. The grains become solid and appear as layers above each other, the layers in the bottom are older and the above ones are more recent.
9. An effervescence takes place due to evolving of carbon dioxide gas.
10. They are converted into metamorphic rocks.
11. Marble is formed.
12. Limestone is formed.

9
1. It is a thin non-compacted layer, which covers the Earth's crust.
2. It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.
3. It is a very hot thick (viscous) liquid underneath the Earth's crust.
4. It is the magma when it reaches the Earth's surface.
5. They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.
6. They are rocks formed from the fragmentation and sedimentation of old rocks.
7. They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.

10

Odd word	Scientific name of the rest
1. Basalt	Minerals forming granite.
2. Mica	Minerals forming basalt.
3. Calcite	Minerals forming granite.
4. Solidification	Stages of formation of sedimentary rocks.

11
1. *Look at the main book on page (194).*
2. *Look at the main book on page (196).*
3.

P.O.C	Magma	Lava
• Definition :	It is a very hot thick liquid underneath the Earth's crust.	It is the magma when it reaches the Earth's surface.
• The resulting rocks :	Plutonic igneous rocks.	Volcanic igneous rocks.
• Place of formation :	The depth of the Earth's crust.	The Earth's surface.

4. *Look at the main book on page (197).*
5. *Look at the main book on page (200).*
6. *Look at the main book on page (202).*

12
1. Granite. 2. Basalt.
3. Sandstone. 4. Limestone.
5. Marble.

13 ① • Igneous rocks. • Sedimentary rocks.
• Metamorphic rocks.
② • Plutonic rocks. • Volcanic rocks.
③ • Erosion • Transportation.
• Sedimentation.
④ *Look at the main book on page (198).*
⑤ 1. Metamorphic rock.
2. & 5. – Igneous rocks.
3. & 4. – Sedimentary rocks.
⑥ 1. Quartz, feldspar and mica.
2. Olivine, pyroxene and feldspar.
3. Calcite.
⑦

Characteristics	Plutonic igneous rocks	Volcanic igneous rocks
• Size of crystals :	Large	Small
• Texture :	Coarse	Smooth
• Holes :	Absent	Present

⑧ Pressure and high temperature.
⑨ By adding hydrochloric acid :

Sandstone	Limestone
No reaction takes place.	An effervescence takes place when hydrochloric acid is added to limestone due to evolving of carbon dioxide gas.

⑩ 1. Granite. 2. Sandstone.
3. Marble.
⑪ 1. **Rock (A) :** Plutonic igneous rock.
Rock (B) : Volcanic igneous rock.
2. The difference between the size of crystals of minerals in the two samples.
3. **Rock (A) :** Granite.
Rock (B) : Basalt.
⑫ Marble is originated as a result of exposing limestone to the factors of pressure and high temperature so that it has more solidity and cohesive than the limestone.

Thinking Skills Questions

1 1. d 2. b 3. d

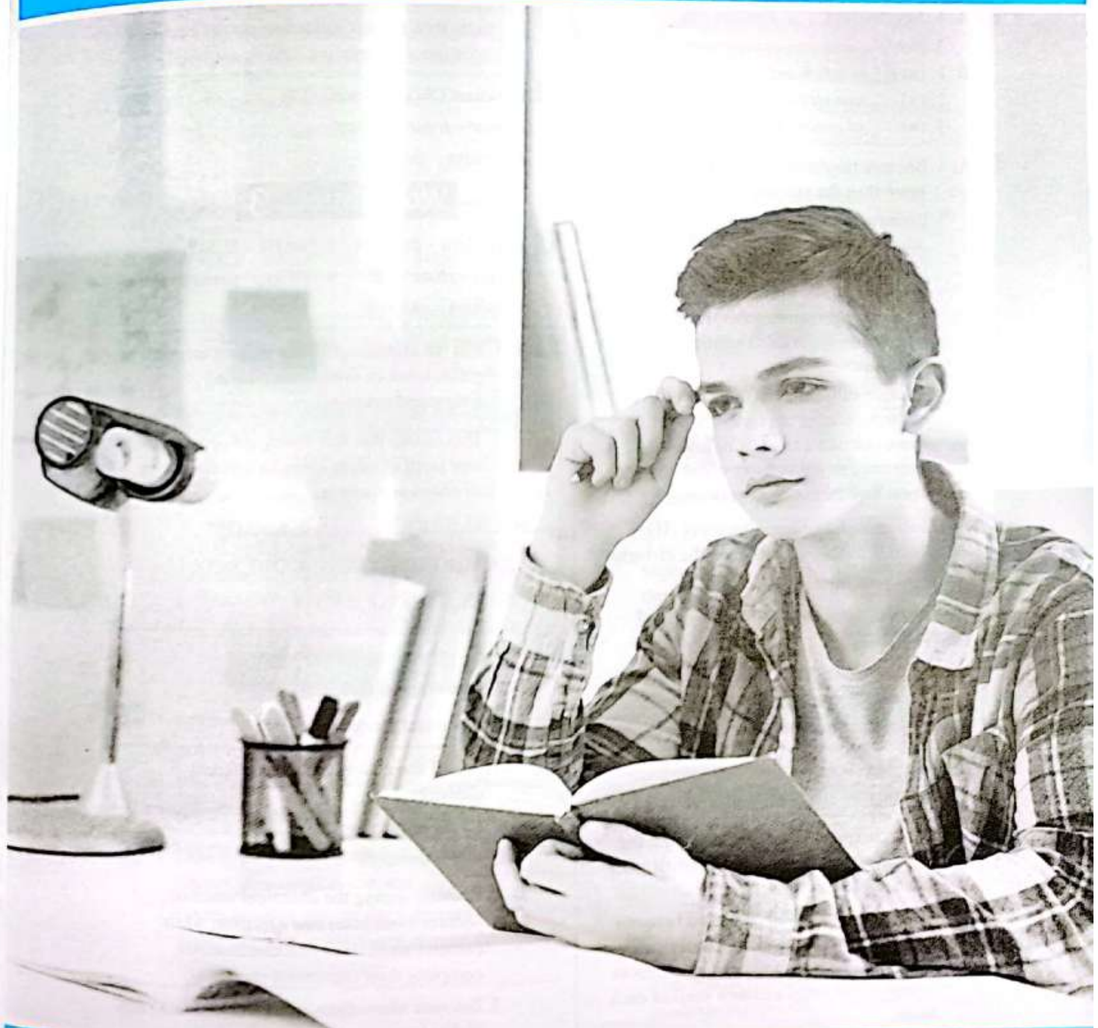
2 1. (1) Limestone.
(2) Pressure and high temperature.
2. Answer by yourself.
3. Marble is from metamorphic rocks, while limestone is from sedimentary rocks.

3 1. • Rock (X) : Igneous volcanic rock – Basalt.
• Rock (Y) : Metamorphic rock – Marble.
2. Plutonic igneous rocks are formed.

4 1. Basalt, because the crystals of minerals forming it are small and can't be seen by the naked eye.
2. Smooth.
3. Effervescence happens due to evolving of carbon dioxide gas.

Project On UNIT Three *Answer by Yourself*

PART 2 Guide Answers of Worksheets



Worksheet 1

1 1. Bromine – mercury 2. loses – positive ion.
3. 7 – 8 4. bad – graphite
5. metals – nonmetals – noble gases.

2 1. d 2. a 3. b 4. c 5. a

3 A. 1. Negative ion. 2. Positive ion.
3. Noble gases.

B. 1. (✖) ...... is less than ......
2. (✖) ...... one electron ......
3. (✖) ...... of nonmetals ......

4 A. 1. Because the number of electrons becomes more than the number of protons.

2. Because aluminium ion is formed when aluminium atom loses three electrons and changes into (Al^{+3}) which contains 10 electrons, while nitrogen ion is formed when nitrogen atom gains three electrons and changes into (N^{-3}) which contains 10 electrons too.

3. Because sulphur atom ($_{16}S$) gains two electrons during the chemical reaction, while calcium atom ($_{20}Ca$) loses two electrons, so the number of energy levels in each of them becomes three.

B. – They are solids except [mercury (Hg)] which is the only liquid metallic element.
– They have metallic luster.
– They are good conductors of heat and electricity.
– They are malleable and ductile.

Worksheet 2

1 1. Metal – 11 2. 11
3. Ionic bond.

2 A. 1. It is a chemical bond resulting from the electric attraction between a positive ion and a negative ion.

2. It is a chemical bond orginated between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.

B. 1. Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable.

2. Because potassium atom ($_{19}K$) tends to lose the outermost electron and changes into positive ion, while chlorine atom ($_{17}Cl$) gains the electron which is lost by potassium atom and changes into negative ion, then electric attraction occurs between positive and negative ions (ionic bond).

3 1. sodium (Na) – chlorine (Cl)
2. ionic – triple covalent
3. positive – negative

Worksheet 3

1 1. trivalent – divalent. 2. NaOH – H_2SO_4
3. gain – share with 4. $(HCO_3)^-$ – monovalent.
5. sodium – chloride

2 A. 1. It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

2. This means that this molecule consists of one atom of silver element and one atom of chlorine element.

B. 1. $Al_2(CO_3)_3$ 2. Na_2SO_4
3. $Mg(OH)_2$ 4. $(NH_4)_2CO_3$
5. $Ca_3(PO_4)_2$

3 A. 1. c 2. b

B. 1. Atomic group (radical).
2. Chemical formula.

4 A. 1. ...... of three atoms of two different elements.
2. ...... is tetravalent.
3. ...... is zero.

B. 1. Because during the chemical reaction, sodium atom loses one electron, while calcium atom loses two electrons to complete their outermost shell.

2. Because aluminium is trivalent and oxygen is divalent.

Worksheet 4

1 A. 1. Bases. 2. Salts.

B. 1. Because acids when dissolved in water produce positive hydrogen ions $(H)^+$ which responsible for their properties.

2. Because limewater contains negative hydroxide ion, while lead sulphate is formed from combination of positive metal ion with negative atomic group.

2 A. 1. blue – negative hydroxide
2. soluble – insoluble

B. By using litmus paper in each tube :
- If it is changed to red, the substance is an acid.
- If it is changed to blue, the substance is a base.

3 1. b 2. c 3. d

4 A. 1. Carbon dioxide. 2. Lead sulphate.
3. Hydrochloric acid. 4. Calcium oxide.

B.

Sodium hydroxide	Sulphuric acid
- It is a base.	- It is an acid.
- It gives on dissociation in water hydroxide ions $(OH)^-$.	- It gives on dissociation in water hydrogen ions $(H)^+$.
- It has a bitter taste.	- It has a sour taste.
- It changes the colour of litmus paper into blue.	- It changes the colour of litmus paper into red.

Worksheet 5

1 1. ferrous – ferric.
2. positive – negative
3. lost – gained – shared with.
4. negative – electrons

2 1. Due to the completeness of its outermost energy level with electrons.

2. Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue.

3 A. *Answer by yourself.*

B. 1. c 2. d 3. c

4 A. 1. Na_2O 2. $CuSO_4$
3. Na_2CO_3 4. HCl

B. 1. It is the atom which loses or gains an electron or more during the chemical reaction.

2. It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it is not existed solely.

Worksheet 6

1 A. 1. double covalent – two active oxygen
2. oxygen – magnesium oxide
3. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$

The mass of the products $= 2\,(24 + 16)$
$= 2 \times 40$
$= 80$ gm.

B. 1. $N_2 + 3H_2 \longrightarrow 2NH_3$
2. $2Ca + O_2 \longrightarrow 2CaO$
3. $2KI + Cl_2 \longrightarrow 2KCl + I_2$

2 1. Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium.

$2Mg + O_2 \xrightarrow{\Delta} 2MgO$

2. To achieve the conservation law of matter.

3 1. It is the breaking of the existing bonds between the atoms of the molecules in the reactant and forming of new bonds between the atoms of the molecules in products.

2. The chemical compound is produced from combination of its elements by constant weight ratios.

4 **Word equation :** Hydrogen + Oxygen $\longrightarrow$ Water

Symbolic equation :

$$2H_2 \;+\; O_2 \longrightarrow 2H_2O$$
$$2\,(2 \times 1) + (2 \times 16) \longrightarrow 2\,[(2 \times 1) + 16]$$

- The sum of reactants masses $= 2(2 \times 1) + (2 \times 16)$
$= 4 + 32 = 36$ gm.

- The sum of products masses $= 2(2 + 16) = 36$ gm.

∴ The sum of reactants masses = The sum of products masses which achieves the law of conservation of matter.

PART 2

Worksheet 7

1 1. White clouds of ammonium chloride are formed.

$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$

2. Carbon dioxide is produced.

$C + O_2 \xrightarrow{\Delta} CO_2$

2 A. 1. Direct combination reactions.
2. Sulphur oxides.
3. Carbon dioxide gas.

B. *Answer by yourself.*

3 1. Because during lightning nitrogen oxides are produced.
2. Because they poisonous acidic gases that affect the nervous system and the eye.

4

P.O.C	Carbon oxides	Sulphur oxides
1. Examples :	- Carbon monoxide (CO). - Carbon dioxide (CO_2).	- Sulphur dioxide (SO_2). - Sulphur trioxide (SO_3).
2. The negative effect :	- Carbon monoxide causes headache, fainting, severe stomach-aches and may lead to death. - Increasing the ratio of carbon dioxide gas in air leads to increasing the air temperature.	They cause respiratory system malfunction, because they are acidic gases and cause building corrosion.

General Exercise of the School Book on Unit One

1 1. Valency. 2. Ionic bond.
3. Acids. 4. Chemical reaction
5. Atomic group. 6. Chemical equation.
7. Bases.

2 A. *Answer by yourself.*

B. 1, 2 & 3. *Look at the main book on pages (18, 28 & 20).*

4. *Look at the main book on page (54).*

3 A. 1. Carbon + Oxygen $\xrightarrow{\Delta}$ Carbon dioxide

$C + O_2 \xrightarrow{\Delta} CO_2$

2. Carbon monoxide + Oxygen $\xrightarrow{\Delta}$ Carbon dioxide

$2CO + O_2 \xrightarrow{\Delta} 2CO_2$

3. Ammonia + Hydrochloric acid $\xrightarrow{conc.}$ Ammonium chloride

$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$

B. 1. $Ca(NO_3)_2$ 2. $CuSO_4$
3. Na_2CO_3 4. Al_2O_3

C. *Answer by yourself.*

Model Exam 1 on Unit One

1 A. 1. (✓)
2. (✗) ...... nitrate group is $(NO_3)^-$, while that of nitrite group is $(NO_2)^-$.
3. (✗) ...... 6 atoms for three ......
4. (✗) ...... two positive charges.

B. 1. Sodium nitrate.
2. Calcium hydroxide.
3. Sulphuric acid.
4. Sodium oxide.

C. It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.

2 A. 1. Nitrogen oxides.
2. Bases. 3. graphite.
4. white.

B.

Element	Electronic configuration			(1) Its type	(2) Type of its ion	(3) Valency
	K	L	M			
$_{18}Ar$	2	8	8	Noble gas	No ion	Zero
$_{12}Mg$	2	8	2	Metal	Positive	Divalent
$_{16}S$	2	8	6	Nonmetal	Negative	Divalent
$_{8}O$	2	6	–	Nonmetal	Negative	Divalent
$_{11}Na$	2	8	1	Metal	Positive	Monovalent

C. To acheive the law of conservation of matter (mass).

3 A. 1. two – one
2. air – lung cancer.
3. $Al(OH)_3 - CaCO_3 - H_2SO_4$
4. ionic bond – single covalent bond.

B. 1. **By putting litmus paper, if the litmus paper changes into :**
- Red so, it is H_2SO_4
- Blue so, it is $Ca(OH)_2$

2. **By adding water with shaking :**
- If it is soluble in water so, it is NaCl
- If it is insoluble in water so, it is AgCl

C. It changes into a positive ion carries a number of positive charges equals to the number of given electrons.

4 A. 1. c 2. d 3. a 4. d

B. 1. $C + O_2 \xrightarrow{\Delta} CO_2$

2. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$

C. 2Mg + O_2 $\xrightarrow{\Delta}$ 2MgO

(2 × 24) (2 × 16) 2 (24 + 16)

48 + 32 2 × 40

80 gm 80 gm

- The sum of reactants masses = 80 gm.
- The sum of products masses = 80 gm.

Model Exam 2 on Unit One

1 A. 1. Chemical reaction.
2. Triple covalent bond.
3. valency.
4. Atomic group.

B. 1. $Fe(OH)_3$
2. $Al_2(SO_4)_3$
3. $Ca(NO_3)_2$
4. Na_2CO_3

C. Because acids when dissolved in water produce positive hydrogen ions H^+ which responsible for their properties, while bases when dissolved in water produce negative hydroxide ions $(OH)^-$ which responsible for their properties.

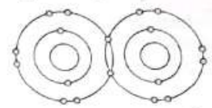
2 A. 1. Sodium ⟶ the rest are nonmetal elements.
2. HCl ⟶ the rest are salts.
3. H_2O ⟶ the rest are acids.
4. Respiratory system malfunction - the rest are the negative effects of carbon monoxide.

B. 1. A base. 2. A metal oxide.
3. An acid. 4. A salt.

C. 1. A non-metallic element.
2. Divalent – tetravalent – hexavalent.

3 A. 1. Calcium oxide – sodium oxide – carbon dioxide – sulphur trioxide
2. carbon dioxide 3. metals – nonmetals
4. Nitrogen – sulphur

B. 1.



2, 3, 4 : *Answer by yourself.*

C.

The atom	The ion
1. It is electrically neutral in its ordinary state.	1. It is positive or negative electric charge.
2. The number of electrons equals the number of protons.	2. The number of electrons is more or less than the number of protons.
3. It outermost energy level is not completely filled with electrons except atoms of noble gases.	3. Its outermost energy level is completely filled with electrons.

4 A. 1. Argon. 2. Hydroxide group.
3. Copper. 4. Sodium sulphide.

B. 1. b 2. d 3. a 4. c

C. Increasing the air temperature.

Worksheet 8

1 A. 1. It is an effect attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.
2. It is the ability of the Earth to attract that object to its centre.

B. 1. force – direction.
2. Gravitational forces – nuclear forces

2 A. 1. c 2. a 3. c

B. 1. Because Earth's gravitational acceleration changes from one place to another.

2. Because the force acting on the wall is improper.

3 A. 1. Weight = Mass × Earth's gravitational acceleration

= 5 × 10 = 50 newton.

2. Mass = $\frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$

$= \frac{392}{9.8} = 40$ kg.

B. 1. (✗) 2. (✓) 3. (✗)

4 1. Its weight will increase.

2. It will move from its position.

Worksheet 9

1 1. b 2. c 3. a

2 *Look at the main book on page (105).*

3 A. 1. nuclear

2. weak nuclear forces – strong nuclear forces.

3. nucleus. 4. electric – mechanical

B. 1. They are used in producing electric energy from the nuclear energy and in military purposes.

2. They are used to get radioactive elements and radiations which are used in :

- Medicine.
- Scientific researches.
- Industry.

4 1. Gravitational forces.

2. Electromagnetic forces.

3. Strong nuclear forces.

4. Weak nuclear forces.

Worksheet 10

1 A. 1. Force of inertia – friction force

2. rushed back – inertia

B. 1. a 2. b

2 - Fig. (1) : The bus stops suddenly, because the passenger is rushed forward due to inertia as he tries to maintain his state of motion.

- Fig. (2) : The bus moves suddenly, because the passenger is rushed backward due to inertia as he tries to maintain his state of rest.

3 A. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

B. 1. (✓) 2. (✗) Inertia is ......

4 1. Due to inertia, as they try to maintain their state of motion.

2. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

3. Due to inertia, as he tries to maintain his state of motion.

Worksheet 11

1 A. It is the resistant force (against motion) originated between the object in motion and the medium touching it.

B. 1. (✓)

2. (✗) ...... from the lower concentration to the higher one.

3. (✗) ...... to increase friction forces.

2 1.
- It prevents feet from slipping on roads during walking.
- It helps to stop and start car motion.
- It helps in burning of match.

2. *Look at the main book on page (123).*

3 1. To decrease friction between moving parts of machines and prevent their erosion.

2. To increase friction between tyres and the road to help car in starting and stopping motion.

Worksheet 12

1 1. friction force. 2. the electric bell.

3. forces inside living systems.

4. nuclear energy 5. friction

2 *Answer by yourself.*

3 A. 1. Object's weight. 2. Friction forces.

3. Electric generator.

B. • The weight of the person on Earth's surface $= m \times g = 75 \times 9.8 = 735$ N

• The weight of the person at a height of 200 km $= 75 \times 9.2 = 690$ N

• The amount of decrease in weight $= 735 - 690 = 45$ N

4 A. 1. safety belts – inertia.

2. electric – magnetic

3. lower – higher

B. 1. The mass of the bird remains fixed, while the weight of the bird decreases.

2. The driver and the passengers will be rushed forward.

Worksheet 13

1 A. 1. The movement of the Moon around the Earth.

2. The motion produced after throwing a stone in water.

3. The motion of the simple pendulum.

B. 1. b 2. c

2 1. It is a motion which is regularly repeated at equal periods of time.

2. It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.

3. It is the motion in which the object's position is changed relative to a fixed point (or a fixed frame of reference) from time to time between initial and final positions.

3 1. Car motion – train motion

2. backward.

3. transitional – periodic

4 Fig. (1) & (3) : Transitional motion.

Fig. (2) & (4) : Periodic motion.

Worksheet 14

1

Mechanical waves	Electromagnetic waves
1. They are produced by the vibration of the medium particles.	1. They are accompanied by electromagnetic forces.
2. They need a medium to transfer through.	2. They spread in all media and free space.
3. Their speed is relatively low.	3. Their speed is extremely high equals 300 millions m/sec.
Examples : • Sound waves. • Water waves.	Examples : • Light waves. • X-rays. • Radio waves.

2 A. 1. Ultraviolet – infrared

2. mechanical waves – electromagnetic waves.

B. 1. (✗) 2. (✓)

3 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

2. Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.

3. Because sound is mechanical waves which can't travel through free space.

4 A. *Answer by yourself.*

B. 1.
- X-rays.
- They are used in studying the inner structure of minerals crystals.

2. *Answer by yourself.*

General Exercise of the School Book on Unit Two

1 1. d 2. b 3. b 4. c 5. a

6. c 7. c 8. c

2 A. 1. It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.

2. It is a motion which is regularly repeated at equal periods of time.

3. This means that the amount of Earth's gravitational to this object is 60 newton.

4. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

B. 1. Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to non-spherical shape of the Earth.

2. Because Earth's gravitational acceleration changes from one place to another.

3. Due to inertia, as they try to maintain their state of motion.

C. 1. Transitional motion.

2. Weight.

Model Exam 1 on Unit Two

1 **A.** 1. d 2. d 3. a 4. d

B. 1. Electromagnet.

2. Electric energy changes into magnetic energy.

3. The pins will fall – The electric current has a magnetic effect.

C. It helps in stopping and starting cars motion.

2 **A.** 1. the object in motion – the medium touching it.

2. its weight – its mass

3. stringed – pneumatic

4. electricity – military

B. The pen doesn't fall on the ground on pulling the paper quickly, due to inertia which makes objects resist the change of their rest state.

C. Object's mass

$$= \frac{\text{object's weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{98}{9.8} = 10 \text{ kg.}$$

3 **A.** 1. Force. 2. Mechanical waves.

3. periodic motion. 4. weight.

B. 1. They are used in :

- photographing bones to detect the sites of bone fractures.
- examining mineral raws in industry and showing errors, pores and cracks in these minerals.

2. – It prevents feet from slipping on roads during walking.

- It helps in stopping and starting cars motion.
- It helps in burning match.

3. They are used in :

- night vision systems used by modern military forces.
- remote sensing instrument to photographing the Earth's surface using satellites.
- cooking food.
- making remote sets.

4. It is used to get radioactive elements and radiations which are used in :

• Medicine. • Scientific researches.

• Industry.

C. Because they have heat effect property.

4 **A.** 1. d 2. c 3. a

B. 1. (✗) 2. (✗) 3. (✓) 4. (✓)

C. Light waves : from electromagnetic waves.
Sound waves : from mechanical waves.

Model Exam 2 on Unit Two

1 **A.** 1. electric. 2. stopping.

3. mechanical 4. vibrating

B. 1. They are used to lift scrap iron and cars in ports.

2. It is used to get radioactive elements and radiations which are used in medicine, scientific researches and industry.

3. They are used in medical purposes as the treatment and discovering of some swellings.

4. It is used in light shows.

C. They are waves that need a medium to transfer through.

2 **A.** 1. c 2. b 3. c 4. b

B. 1. less 2. less 3. decreases.

C. The iron bar is changed into a temporary magnet.

3 **A.** 1. (✗) ...... is equal to ......

2. (✗) Contraction and relaxation of muscles ......

3. (✗) ...... = its mass × gravitational acceleration.

4. (✗) ...... mechanical

B. 1. Forces of inertia.

2. Friction forces.

3. Forces inside living systems.

4. Forces inside living systems.

C. Because sound is from mechanical waves, while light is from electromagnetic waves.

4 **A.** 1. Nuclear force. 2. Inertia.

3. Force 4. Motion.

B. 1. Sound waves – Electromagnetic waves.

2. Friction force – Fundamental forces in nature.

3. Light waves – mechanical waves.

4. Bell hand work – Applications of electromagnetic forces.

C.

Transitional motion	Periodic motion
1. It is a motion in which the object's position is changed from time to time relative to a fixed point.	1. It is a motion which is regularly repeated at equal periods of time.
2. It has initial and final positions. **Examples :** – A bicycle motion. – A train motion. – A car motion.	- It doesn't have initial or final positions. **Examples :** – A vibrating motion : As the motion of the simple pendulum. – A circular motion : As the movement of the Moon around the Earth. – A wave motion : As the motion of water waves.

Worksheet 15

1 **A.** 1. the mass of the two objects – the distance between them.

2. Mercury – Neptune.

3. Milky Way galaxy – Chopped Hay galaxy.

B. 1. They are the greatest units that form the universe.

2. It is any body swims in the space such as stars, planets, moons and rocky or gaseous bodies.

2

Points of comparison	The inner planets	The outer planets
• Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
• Their arrangement from the Sun :	Mercury – Venus – Earth and Mars.	Jupiter – Saturn – Uranus and Neptune.
• Structure :	Rocky bodies.	Gaseous bodies.
• Size :	Small in size.	Big in size.
• Density :	High.	Low.
• No. of moons rotating around them :	A few number of moons except Mercury and Venus have no moons.	Large number of moons.
• Atmosphere :	All of them have an atmosphere except Mercury.	All of them have an atmosphere.

3 **A.** 1. Because they consist mainly of gaseous bodies.

2. Because these distances are too huge to be measured by kilometres.

B. 1. b 2. d 3. b

4 **A.** Distance in light year $= \frac{\text{Distance in km}}{9.467 \times 10^{12}}$

$$= \frac{75.736 \times 10^{12}}{9.467 \times 10^{12}}$$

$= 8$ light years.

B. 1. Light year. 2. The Sun.

C. – They are used for identifying the celestial bodies.

– Reflecting telescope and refracting telescope.

Worksheet 16

1 1. Meteors. 2. Moons.

3. The belt of the wanderer asteroids.

4. Halley's comet.

2 **A.** 1. (✓) 2. (✗) ...... Mars and Jupiter.

B. – They are masses of rocks, ice and solidified gases which revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.

– They consist of two parts, which are :

1. The head : It contains icy spheres which are a mixture of :

- Solidified gases [carbon dioxide, nitrogen and methane gases].
- Rocky parts.
- Dust and water molecules.

2. The tail : It consists of a gaseous cloud.

– The most famous comet is Halley's comet which completes its revolution around the Sun each 76 years.

3 1. b 2. c 3. d 4. b

4 1. Because the gravity of planet increases by increasing its mass and Jupiter is the biggest planet in mass.

2. Due to the difference in the gravity acceleration from a planet to another.

Worksheet 17

1
1. 6386 km – 5.9×10^{24} kilograms.
2. a slight flattening – indented outward
3. Ozone – ultraviolet
4. third – 150 million
5. carbon dioxide

2 A. 1. – It reduces the effect of oxygen gas in burning processes.
– Plants use it to form proteins.
2. – It is used in respiration process of living organisms.
– It helps in combustion process of fuels.

B. 1. nitrogen 2. 365.25

3
1. Due to the presence of the atmosphere that appears as a white colour around the Earth.
2. Because it is the biggest inner planet and it is smaller than any planet from the outer planets.

4
– The atmosphere. – The hydrosphere.
– The suitable temperature. – The gravity.
– The suitable atmospheric pressure.

Worksheet 18

1 1.

Salty water	Fresh water
- It represents 97% of the water area on the Earth's surface.	- It represents 3% of the water area on the Earth's surface.
- It exists in : • Oceans. • Seas.	- It exists in : • Rivers. • Lakes. • Snow at the poles. • Ground water.

2.

Points of comparison	The inner core	The outer core
• Structure :	It is formed of iron and nickel in a solid state.	It is formed of molten metals.
• Thickness :	It radius is about 1350 km.	About 2100 km.

2
- Plants use water in photosynthesis process to form food.
- Human benefits from water in :
  • Completing food digestion and absorption processes in the digestive system.
  • Sharing in blood formation.
  • Keeping the constancy of body temperature.

3
1. Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.
2. Due to :
   - The presence of water.
   - The presence of the atmospheric envelope containing oxygen gas which is needed for life.
   - Its temperature is suitable during both day and night.
   - Its atmospheric pressure and its gravitational force are suitable.
3. Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.
4. Due to the gravitational force of the Earth.

4 1. d 2. a 3. d

Worksheet 19

1 1. a 2. c 3. a 4. a

2
1. It becomes hotter.
2. The combustion processes will be fast and proceeds without any control.
3. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
4. The ultraviolet rays will reach the Earth's surface and harm living organisms.

3
1. No. of moons rotating around Neptune planet.
2. The acceleration due to gravity on the surface of Mercury planet.
3. The thickness of the outer core.
4. The thickness of the Earth's crust.
5. The average radius of the Earth.
6. The ratio of land on the Earth's surface.

4
1. rocky – gaseous 2. 71
3. moons. 4. Jupiter – Mercury.

Worksheet 20

1 A. 1. Soil. 2. Magma. 3. Rock.

B.

Points of comparison	Granite	Basalt
1. Colour :	Pink or grey.	Dark.
2. Minerals forming it :	Quartz, feldspar and mica.	Olivine, pyroxene and feldspar.
3. Found in :	The Eastern Desert and Sinai Peninsula.	Abou-Zaabal, near Abou Rawash and El-Fayoum.

2
1. igneous – sedimentary – metamorphic
2. plutonic – volcanic 3. small-sized.
4. volcanic flows – lava.
5. Granite – basalt

3
1. Because the upper part is fragmented and loosened layer.
2. Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized.
3. Because minerals that form them don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.
4. Due to the extruding of gases from volcanic flows during their cooling and formation of rock.

4
1. Igneous rocks are ......
2. Soil is formed ......
3. Plutonic rocks are formed ......
4. Granite ......

Worksheet 21

1
1. An effervescence takes place due to evolving of carbon dioxide gas.
2. They convert into metamorphic rocks.
3. Limestone is formed.

2
1. Limestone – sandstone – marble
2. erosion – transportation – sedimentation.
3. white – smooth – yellow – coarse
4. older – recent.

3 A. 1. Sedimentary rocks. 2. Marble.
3. Sandstone.

B. 1. (✗) Marble has ......
2. (✗) ...... that forms sandstone ......

4 (1) Pressure and high temperature.
(2) Erosion, transportation and sedimentation
- Marble is an example of metamorphic rocks.

General Exercise of the School Book on Unit Three

1 1. Magma. 2. Volcanic igneous rock.
3. Meteorites.

2
1. elliptical – one plane perpendicular
2. quartz – feldspar – mica – olivine – pyroxene – feldspar

3
1. Because the expansion of atmosphere in space helps in burning millions of small falling meteors completely before reaching the Earth's surface.
2. Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized.
3. Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

4 1. b 2. d 3. c

5
1. *Look at the main book on page (182).*
2. *Look at the main book on page (200).*
3. *Look at the main book on pages (161 & 162).*

6 *Answer by yourself.*

Model Exam 1 on Unit Three

1 A. 1. (✓) 2. (✗) 3. (✗) 4. (✗)

B. 1. Light year. 2. Comets.
3. Marble. 4. Moons.

C. Because the size of crystals of minerals forming plutonic rocks is large, while the size of crystals of minerals forming volcanic rocks is small.

2 A.

Odd word	Scientific name
1. Jupiter.	Inner planets.
2. Halley.	planets.
3. The Sun.	planets.
4. Earthquakes.	Celestial bodies.

B. (1) Earth's crust. (2) Mantle.
(3) Outer core. (4) Inner core.

C. It protects living organisms from the harmful ultraviolet rays.

3 A. 1. 150 million km. 2. 76 cm.Hg.
3. Ranging from 0.7 to 1.3 gm/cm^3.
4. 3 moons.

B. 1. c 2. b 3. b 4. b

C. The temperature on Earth's surface will increase, so it is not suitable for the continuity of life of living organisms.

4 A. 1. Ocean – river
2. elliptical – perpendicular
3. Magma – volcanic flows – lava.
4. white – water bodies.

B. 1. g - F 2. c - D 3. a - B
4. d - C 5. e - E

C.

Points of comparison	The inner core	The outer core
1. Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Their arrangement from the Sun :	Mercury – Venus – Earth and Mars.	Jupiter – Saturn – Uranus and Neptune.
3. Size :	Small in size.	Big in size.
4. Structure :	Rocky bodies.	Gaseous bodies.
5. Density :	High.	Low.
6. Atmosphere :	All of them have an atmosphere except Mercury.	All of them have an atmosphere.
7. No. of moons rotating around them :	A few number of moons (except Mercury and Venus have no moons).	Large number of moons.

Model Exam 2 on Unit Three

1 A. 1. d 2. c 3. a 4. e

B. 1. carbon dioxide 2. limestone
3. Galaxies 4. Volcanic

C. They are rocks formed from the cohesion of sediments.

2 A. 1. Quartz – Feldspar – Mica
2. Olivine – Pyroxene – Feldspar.
3. Mineral calcite. 4. Quartz.

B. 1. Outer core. 2. Earth.
3. The belt of wanderer asteroids.
4. Milky way.

C. *Look at the main book on page (161).*

3 A. 1. erosion – transportation – sedimentation.
2. Nitrogen – 78
3. Ozone – ultraviolet
4. Sedimentary – metamorphic

B. 1. Layer no. (2)
2. Layer no. (1)
3. Layer no. (4)

C. Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.

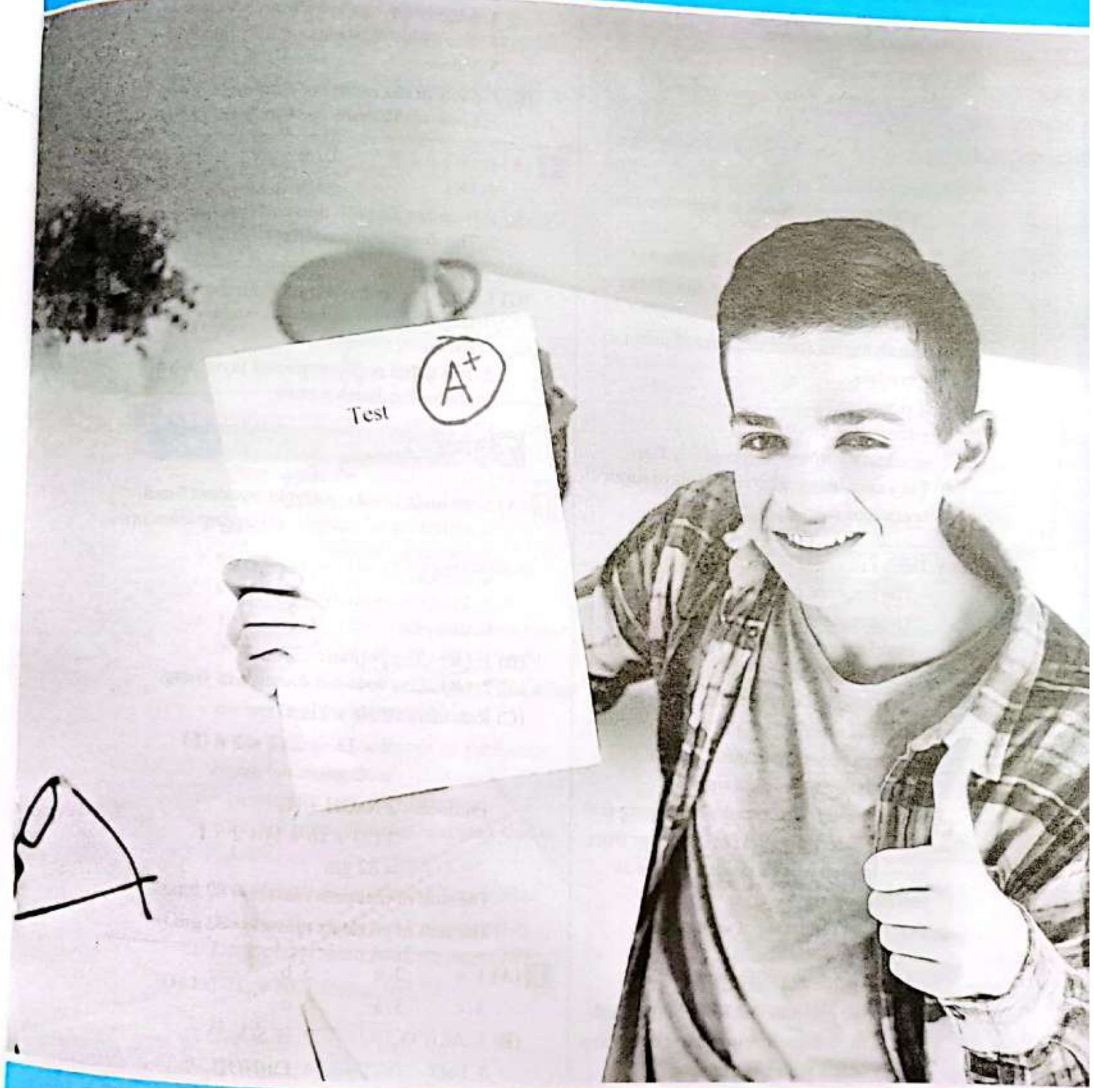
4 A. 1. (✗) ...... is smaller ......
2. (✗) ...... is 97%
3. (✓).
4. (✗) ...... is 76 cm. Hg

B. 1. Metamorphic rock
2. Igneous rock
3. Sedimentary rock
4. Igneous rock.

C. pressure and high temperature.

PART 3

Guide Answers of Final Examinations



(B) 1. They are used in :
- photographing bones to detect the sites of bone fractures.
- examining mineral raws in industry and showing errors, pores and cracks in these minerals.

2. They are used in medical purposes as the treatment and discovering of some swellings.
3. They are used to sterilize the sets of surgical operations rooms.
4. They are used in :
- night vision systems used by modern military forces.
- remote sensing instrument to photographing the Earth's surface using satellites.
- cooking food.
- making remote sets.

(C) 1. – Headache. – Fainting.
– Severe stomach-aches and may lead to death.

2. They are acidic gases that cause :
– Respiratory system malfunction (breathing problems).
– Building corrosion.

3. It causes air pollution and lung cancer.

4 (A) 1. Because they are from heavy elements that descend towards the centre of the Earth, due to its rotation around its centre.
2. Due to the gravitational force of the Earth.
3. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
4. Because oxygen atom shares each of the two hydrogen atoms with one electron.
5. Due to the extruding of gases from volcanic flows during their cooling and formation of rock.

(B) 1. (✓)
2. (✗) ...... the Earth's crust.
3. (✗) ...... nitrogen gas ......
4. (✗) ...... mechanical energy into ......
5. (✗) ...... into blue.
6. (✗) ...... every 76 years.

(C) 1. The driver and passengers will be rushed forward.
2. The iron bar is changed into a temporary magnet.
3. A white powder of magnesium oxide is formed.

$$2Mg + O_2 \xrightarrow{\Delta} 2MgO$$

4. Parts of machines getting hot and erosion occurs.

4 New Cairo Educational Zone

1 (A) 1. single covalent bond – triple covalent bond.
2. initial – final positions.
3. Mercury – Neptune.
4. mechanical – electric
5. a. two active oxygen atoms.
b. oxygen – magnesium oxide
6. carbon dioxide 7. head – tail.

(B) 1. (✗) The white marble .....
2. (✓)

2 (A) 1. Na_2SO_4 2. Al_2O_3

(B) 1. Ball's weight
= Ball's mass × Earth's gravitational acceleration.
= 0.3 × 9.8 = 2.94 newton.
2. Boy's weight = 50 × 9.8 = 490 newton.

(C) 1. They are used to sterilize the sets of surgical operations rooms.
2. Examining and curing equipments for the human body.

3 (A) 1. Atomic group. 2. Earth.
3. Friction forces. 4. Periodic motion.
5. Bromine. 6. Nuclear force.
7. Salts.

(B) 1. - Element ($_8A$) is a nonmental.
- Element ($_{12}B$) is a metal.
2. Ionic bond.

(C) 1. White clouds of ammonium chloride are formed.
$[NH_3 + HCl \xrightarrow{Conc.} NH_4Cl(\text{white clouds})]$.
2. The produced electric energy from the dynamo will increase.

4 (A) 1. Because it prevents the penetration of the thermal rays produced from the Earth to outer space.
2. Because sound is a mechanical wave which can't travel through free space.
3. Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.
4. To increase friction between tyres and the road to help car in starting and stopping motion.
5. Because sodium chloride is water soluble salt, while silver chloride is water insoluble salt.

(B) 1. a 2. d 3. c 4. c

5 Saint Mary Integrated Schools

1 (A) 1. Weak nuclear force.
2. Outer core.
3. Mechanical waves.
4. Salts. 5. Sulphur oxides.

(B) 1. $Fe(OH)_3$ 2. $AlPO_4$
3. $Ca(NO_3)_2$

(C) Object's weight =
Object's mass × Earth's gravitational acceleration.
- Object's weight on Earth's surface
= 75 × 9.8 = 735 newton.
- Object's weight at a height 200 km
= 75 × 9.2 = 690 newton.
- The amount of decrease in the weight
= 735 – 690 = 45 newton.

2 (A) 1. d 2. c 3. a 4. b 5. b

(B) a. Element (X).
b. Ionic bond.
c. NO, because element (y) is a noble gas which its outermost energy level is completely filled with electrons.

(C) 1. X-rays
2. The belt of the wanderer asteroids
3. Bases

3 (A) 1. crust – inner core.
2. transitional motion – periodic motion.
3. $2Mg + O_2$
4. mechanical – electromagnetic
5. Jupiter – Earth.
6. Granite – basalt – sandstone – limestone

(B) 1. White clouds of ammonium chloride are formed.
$[NH_3 + HCl \xrightarrow{Conc.} NH_4Cl(\text{white clouds})]$.
2. The ultraviolet rays will reach the Earth's surface and harm living organisms.
3. It is extruded in the form of volcanic flows and it is called lava.

4 (A) 1. Because ionic bond arises between two different atoms (metal and nonmetal) as a result of the electric attraction between a positive ion of an atom of a metallic element and a negative ion of an atom of a nonmetallic element, while covalent bond arises between two similar or different nonmetal atoms.
2. Due to inertia, as they try to maintain their state of motion.
3. Because they consist mainly of gaseous bodies.

(B) 1. (✓)
2. (✗) ...... increases with increasing ......
3. (✗) Ultrasonic waves ......
4. (✗) All metals are ......

(C) 1. They are used in :
– night vision apparatus used by modern military forces.
– remote sensing instrument to photographing Earth's surface using satellites.
– cooking food.
– making remote sets.

2. They are used to sterilize the sets of surgical operations rooms.

3. – It reduces the effect of oxygen gas during burning processes.
   – Plants use it to form proteins.

4. It is used in making of :
   – Electric winches which lift scrap iron and cars in ports.
   – Electric bells.

6 East Nasr City Educational Zone

1 (A) 1. c 2. b 3. b 4. b
5. a 6. c 7. b

(B) 1. *Look at the main book on page (19).*
2. *Look at the main book on page (161).*
3. *Look at the main book on page (135).*

(C) Object's weight
= Object's mass × Earth's gravitational acceleration
$= 0.5 \times 9.8 = 4.9$ newton.

2 (A) 1. Galaxies. 2. Atomic group (Radical).
3. Periodic motion. 4. Chemical reaction.
5. Object's weight. 6. Metals.
7. Light year.

(B) 1. Infrared (IR) rays.
2. X-rays.
3. Ultraviolet (UV) rays.

(C) 1. An acid. 2. A metal oxide.
3. A salt. 4. A base.

3 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✓)
5. (✓) 6. (✗) 7. (✓) 8. (✓)

(B) 1. CO_2 2. $2CO_2$ 3. $2MgO$

(C) 1. Due to the formation of ammonium chloride as white clouds.
$NH_3 + HCl \xrightarrow{Conc.} NH_4Cl$
2. Due to inertia, as they try to maintain their state of motion.
3. Because they consist mainly of gaseous bodies.
4. Due to the precipitation of calcium carbonate in lime solutions.

4 (A) 1. ozone 2. carbon dioxide
3. double covalent – triple covalent
4. electric – mechanical
5. red – blue. 6. Mercury – Neptune.

(B) 1. It has a dangerous impact on the human being which causes :
• Headache. • Fainting.
• Severe stomach-aches and may lead to death.
2. They are poisonous acidic gases that affect the nervous system and the eye.

(C) 1. It is used in making of :
– Electric winches which lift scarp iron and cars in ports.
– Electric bells.
2. It is used in :
– Producing electricity.
– Military purposes.

Giza Governorate

7 Modern Infinity Language School

1 (A) 1. Meteors.
2. Friction forces.
3. X-rays.
4. Galaxies.

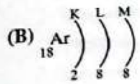
(B) 1. electric – mechanical
2. HCl – direct combination.
3. double covalent – ionic
4. Mars – Jupiter.
5. H_2SO_4 – NaOH
6. large – small

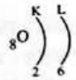
2 (A) 1. b 2. c 3. c 4. c
5. b 6. d 7. a 8. a
9. a 10. d

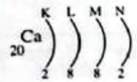
(B) 1. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.
2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

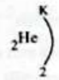
3. Because chlorine atom (nonmetal) gains the electron which is lost by sodium atom, so an electric attraction occurs between positive sodium ion and negative chloride ion.
4. Because the number of electrons becomes more than the number of protons.

3 (A) 1. c 2. f 3. a
4. d 5. e 6. b

(B)

– No ion.


– Negative ion.


– Positive ion.


– No ion.

(C) 1. *Look at the main book on page (158).*
2. *Look at the main book on page (54).*

4 (A) 1. (✓) 2. (✓)
3. (✗) .... is a periodic motion.
4. (✗) .... of mechanical waves.
5. (✓)
6. (✗) .... less than ....
7. (✓)
8. (✗) .... of fresh water ....
9. (✗) .... in an elliptical way.
10. (✓)

(B) 1. They are used in :
- night vision systems used by modern military forces.
- remote sensing instrument to photographing the Earth's surface using satellites.
- cooking food.
- making remote sets.
2. They are used in medical purposes as the treatment and discovering of some swellings.
3. It is used in making of :
- Electric winches which lift scrap iron and cars in ports.
- Electric bells.

4. - It prevents feet from slipping on roads during walking.
- It helps in stopping and starting cars motion.
- It helps in burning match.

(C) An effervescence takes place due to evolving of carbon dioxide gas.

8 Hafr Elbaten School

1 (A) 1. Meteors. 2. Force.
3. Electric motor. 4. Periodic motion.
5. Triple covalent bond.
6. Transitional motion. 7. Noble gases.

(B)

$2Mg$	+	O_2	$\xrightarrow{\Delta}$	$2MgO$
(2×24)		(2×16)		$2\,(24 + 16)$
48	+	32		2×40
	80 gm			80 gm

• The sum of reactants masses = 80 gm.
• The sum of products masses = 80 gm.

(C) 1. Light waves ⟶ the others are mechanical waves.
2. Sodium ⟶ the others are nonmetal elements.
3. Atmosphere ⟶ the others are the layers of Earth.

2 (A) 1. d 2. b 3. b 4. b
5. b 6. c 7. c

(B) Object's weight = Object's mass × Earth's gravitational acceleration
$= 10 \times 9.8 = 98$ newton.

(C) 1. AgCl 2. SO_3
3. Na_2SO_4 4. Al_2O_3
5. HNO_3

3 (A) 1. Force of inertia – friction force
2. ionic – single covalent
3. trivalent.
4. vibrating – transitional
5. Earth's crust

(B) 1. It protects living organisms from the harmful ultraviolet rays.
2. They are used to sterilize the sets of surgical operations rooms.

3. It is used in :
   – Producing electricity.
   – Military purposes.

(C) 1. The driver and passengers will be rushed forward.
2. There is no life.
3. White clouds of ammonium chloride are formed.
   [$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$ (white clouds)].
4. It causes air pollution and lung cancer.

4 **(A)** 1. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
2. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$
3. $C + O_2 \xrightarrow{\Delta} CO_2$

(B) 1. Increasing the air temperature.
2. Affect the nervous system and the eye.
3. It causes the erosion of machines parts and damages them as well.

(C) 1. (✗) 2. (✓) 3. (✗) 4. (✓)

(D) 1. Due to the difference in the gravity acceleration from a planet to another.
2. Because the inner planets consist of solid bodies, while the outer planets consist mainly of gaseous bodies.
3. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
4. Due to :
   - The presence of hydrosphere.
   - The presence of the atmospheric envelope containing oxygen gas which is needed for life.
   - Its temperature is suitable during both day and night.
   - Its atmospheric pressure and its gravitational force are suitable.
5. Because the sediments exist in the lower layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains.

9 Omrania Educational Zone

1 **(A)** 1. 71%
2. Nitrogen oxides 3. Light year
4. Obtain more useful substances from less used substances
5. O_2 6. Ozone
7. head – tail.

(B) 1. a white 2. inertia
3. Strong nuclear forces
4. ultrasonic waves.

(C) Object's weight = Object's mass × Earth's gravitational acceleration = 5 × 9.8 = 49 newton.

2 **(A)** 1. Force. 2. Valency. 3. Meteors.
4. Chemical reaction.
5. The belt of the wanderer asteroids.

(B) 1. To decrease friction force between moving parts of machines and prevent their erosion.
2. To achieve the law of conservation of matter (mass).
3. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
4. Due to :
   – The presence of hydrosphere.
   – The presence of the atmospheric envelope containing oxygen gas which is needed for life.
   – Its temperature is suitable during both day and night.
   – Its atmospheric pressure and its gravitational force are suitable.

(C) 1. They are used in medical purposes as the treatment and discovering of some swellings.
2. *Look at the main book on page (137).*
3. *Look at the main book on page (83).*

3 **(A)** 1. b 2. c 3. a 4. c
5. a 6. b 7. d

(B) 1. *Look at the main book on page (54).*

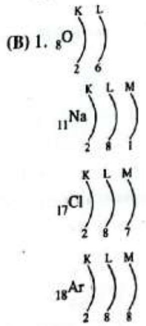
Alexandria Governorate

11 Brilliance Language School

1 (A) 1. a 2. c 3. d 4. a

5. c 6. c

(B) 1.



"Nonmetal"

"Metal"

"Nonmetal"

"Inert gas"

2. a. Double covalent bond.
   b. Ionic bond.

(C) 1. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.

2. White clouds of ammonium chloride are formed.
   $[NH_3 + HCl \xrightarrow{Conc.} NH_4Cl \text{ (white clouds)}]$.

2 (A) 1. They are used in medical purposes as the treatment and discovering of some swellings.

2. They work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

3. It is used in making of :
   - Electric winches which lift scarp iron and cars in ports.
   - Electric bells.

(B) 1. Transitional motion. 2. Halley's comet.
3. Carbon dioxide. 4. Nuclear forces.
5. Magma.

(C) 1. It causes air pollution and lung cancer.
2. Sodium hydroxide turns the red litmus paper into blue and hydrochloric acid has no effect.

3 (A) 1. Because their outermost energy levels are completely filled with electrons, so they don't lose, gain or share with any electrons.

2. To decrease friction between moving parts of machines and prevent their erosion.

3. Due to :
   - The presence of hydrosphere.
   - The presence of the atmospheric envelope containing oxygen gas which is needed for life.
   - Its temperature is suitable during both day and night.
   - Its atmospheric pressure and its gravitational force are suitable.

4. Because Earth's gravitational acceleration changes from one place to another.

5. Because it is a volcanic rock which has very small crystals.

(B) 1. Copper.
2. Sodium sulphide.
3. It helps in burning match.
4. Ammonium.

(C) 1. $(NH_4)_2SO_4$ 2. $CaCl_2$
3. Fe_2O_3 4. $AgNO_3$

(D) 1. Metal. 2. Divalent.

4 (A) $C + O_2 \xrightarrow{\Delta} CO_2$

$12 + (2 \times 16)$ → $12 + (2 \times 16)$

44 gm → 44 gm

The sum of reactants masses = 44 gm.

The sum of products masses = 44 gm.

(B) 1.

P.O.C.	Metal oxides	Nonmetal oxides
Definition :	They are compounds produced from the combination of oxygen with a metal.	They are compounds produced from the combination of oxygen with a nonmetal.
Example :	Na_2O	CO_2

2. *Look at the main book on page (135).*

(C) 1. periodic – transitional
2. the nervous – eye.
3. iron – nickel.

4. electric – mechanical
5. carbon dioxide – nitrogen
6. $2CO_2$

(D) 1. Oxide. 2. Salt.
3. Base. 4. Acid.

12 El-Gomrok Educational Zone

1 (A) 1. Nitrogen – 78%
2. Ozone – ultraviolet
3. 2HCl
4. electric winches – electric bells.
5. balanced
6. soil – non-compacted
7. igneous – sedimentary – metamorphic

(B) 1. – It helps in stopping and starting cars motion.
   – It helps in burning match.
2. They are used in medical purposes as the treatment and discovering of some swellings.
3. Increasing the air temperature.
4. The movement of the Moon around the Earth.

(C) $C + O_2 \xrightarrow{\Delta} CO_2$

$12 + (2 \times 16)$ → $12 + (2 \times 16)$

44 gm → 44 gm

The sum of reactants masses = 44 gm.

The sum of products masses = 44 gm.

2 (A) 1. Electric generator (Dynamo).
2. Chemical reaction.
3. Sulphur oxides.
4. Electromagnetic waves.
5. Celestial body.
6. Atomic group (radical).

(B) 1. *Look at the main book on page (135).*
2. – **Sodium chloride (NaCl) :** A salt dissolves in water.
   – **Silver chloride (AgCl) :** A salt doesn't dissolve in water.

(C) 1. Base. 2. Oxide. 3. Acid. 4. Salt.

3 (A) 1. mechanical
2. $CuCO_3$ 3. third
4. double
5. vibrating
6. Carbon monoxide

(B) 1. Because they have heat effect property.
2. Because acids when dissolved in water produce positive hydrogen ions H^+ which responsible for their properties.

(C) $ZnO - (NH_4)_2CO_3 - Al_2(CO_3)_3 - AgNO_3$

4 (A) 1. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
2. It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

(B) 1. Sodium. 2. HCl
3. Friction force. 4. Jupiter.

(C) 1. *Look at the main book on page (26).*
2. *Look at the main book on page (26).*

13 El-Agamy Educational Zone

1 (A) 1. ionic bond – single covalent bond.
2. balanced – matter.
3. Mercury – Neptune.
4. clouds – hydrochloric acid.

(B) 1. They are used in photographing bones to detect the sites of bone fractures.
2. It is used to get radioactive elements and radiations which are used in : Medicine, industry and scientific researches.
3. It is used in making of :
   – Electric winches. – Electric bells.
4. It protects living organisms from the harmful ultraviolet rays.

(C) 1. 76 cm.Hg.
2. lightning.

2 (A) 1. Earth's gravitational force. 2. Light year.
3. Oxides. 4. Bases.

(B) 1. $C + O_2 \xrightarrow{\Delta} CO_2$
2. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$

(C) *Look at the main book on page (158).*

(D) 1. $CaCO_3$ 2. Al_2O_3

3 (A) 1. Due to :
   - The presence of hydrosphere.

- The presence of the atmospheric envelope containing oxygen gas which is needed for life.
- Its temperature is suitable during both day and night.
- Its atmospheric pressure and its gravitational force are suitable.

2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
3. Because during chemical reactions sodium atom loses one electron.
4. Due to the attraction force of the Sun to the planets.

(B) 1. Silver chloride. 2. A bicycle motion.
3. Infrared rays.

(C) 1. It is a formula that represents the number and the type of atoms in a molecule.
2. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

4 (A) 1. d 2. b 3. b 4. a
5. d 6. a 7. b

(B) 1. The colour of litmus paper changes into red.
2. - We can't burn match.
- We can't stop or start cars motion.
3. It changes into a postive ion carries a number of positive charges equals to the number of given electrons.

(C) Object's weight = Object's mass × Earth's gravitational acceleration.
$= 100 \times 9.8$
$= 980$ newton.

Al-Qaliubya Governorate

14 Al Resala Language School

1 (A) 1. zero – divalent.
2. CO_2
3. reactants – products
4. ionic bond – double covalent bond.
5. A train motion – a person's motion
6. electric – magnetic
7. the mantle – the core.
8. positive hydrogen H^+ – bases

(B) 1. H_2SO_4 2. $Ca(OH)_2$
3. $NaHCO_3$ 4. $Al(OH)_3$

(C) 1. ***Look at the main book on page (54).***
2. ***Look at the main book on page (135).***
3.

P.O.C.	Hg	Br
Type of element	Metal.	Nonmetal.
Physical state	liquid.	liquid.

4. **Light waves :** from electromagnetic waves.
Sound waves : from mechanical waves.

2 (A) 1. Double covalent bond.
2. Mechanical waves. 3. Ozone layer.
4. Weak nuclear force.
5. The Earth's crust. 6. Valency.

(B) 1. Bromine. 2. Sodium chloride.
3. Light wave. 4. Nitrite group.

(C) 1. (✗) .... CO_2 gas ....
2. (✗) Sulphuric acid ....
3. (✗) .... on the decreasing ....
4. (✓)

(D) 1. Potassium hydroxide.
2. Carbon dioxide. 3. Sodium oxide.
4. Hydrochloric acid.

3 (A) 1. b 2. c 3. a 4. c 5. a 6. a

(B) 1. Because they are the farthest four planets from the Sun and they are big.
2. Because the sunlight is an electromagnetic wave which can travel through free space, while the sound of solar explosions is a mechanical wave which can't travel through free space.
3. Because acids when dissolved in water produce positive hydrogen ions H^+ which responsible for their properties.

4. Because $_{13}Al$ atom loses its outermost electrons and changes into a positive ion, while $_{17}Cl$ atom gains an electron to complete its outermost level and changes into a negative ion.

(C) 1. a. $H_2 + Cl_2 \longrightarrow 2HCl$
$(2 \times 1) + (35.5 \times 2)$ → $2(1 + 35.5)$
73 gm → 73 gm
The sum of reactants masses = 73 gm.
The sum of products masses = 73 gm.

b. $S + O_2 \xrightarrow{\Delta} SO_2$
$32 + (16 \times 2)$ → $32 + (16 \times 2)$
64 gm → 64 gm
The sum of reactants masses = 64 gm.
The sum of products masses = 64 gm.

2. Object's weight = Object's mass × Earth's gravitational acceleration
$= 700 \times 9.8 = 6860$ newton.

4 (A) 1. The weight of ....
2. .... a salt.
3. .... are metals that share in ....
4. Meteors .... and they are small rocky masses.
5. .... about 29%
6. .... on inertia force.
7. .... , carbon dioxide gas ....

(B) 1. They are used in :
- photographing bones to detect the sites of bone fractures.
- examining mineral raws in industry and showing errors, pores and cracks in these minerals.

2. – It prevents feet from slipping on roads during walking.
– It helps in stopping and starting cars motion.
– It helps in burning match.

3. They are used in :
– night vision systems used by modern military forces.
– remote sensing instrument to photographing the Earth's surface using satellites.
– cooking food.
– making remote sets.

4. Amplifiers and devices of distributing and controlling sound used in broadcasting studios.

(C) 1. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
2. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$

(D) 1. It changes into a positive ion carries a number of positive charges equals to the number of given electrons.
2. The driver and passengers will be rushed forward, due to the inertia.
3. The mass of the bird remains fixed, while the weight of the bird decreases, because the value of Earth's gravitational acceleration at the equator is less than that at the south pole.
4. The grains become solid and appear as layers above each other, the layers in the bottom are older and the above ones are more recent.

El-Sharkia Governorate

15 Abo-Salem Official Language School

1 (A) 1. positive hydrogen – negative hydroxide
2. Nitrogen – sulphur
3. contraction – relaxation
4. Infrared 5. lower
6. Sandstone

(B) 1. It is a set of symbols and chemical formulae representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction as well.
2. They are resistant forces (against motion) originated between the object in motion and the medium touching it.

(C) 1. They are used to sterilize the sets of surgical operations rooms.
2. It is used in :
– producing electricity.
– military purposes.
3. They are used for identifying the celestial bodies.

2 (A) 1. Transitional motion.
2. Moons.

3. Ammonium chloride.
4. Triple covalent bond.

(B) 1. Na_2SO_4
- The number of atoms = 7
- The number of elements = 3

2. $Al_2(CO_3)_3$
- The number of atoms = 14
- The number of elements = 3

3. NH_4NO_3
- The number of atoms = 9
- The number of elements = 3

(C) 1. Both of them seem to be at rest to each other.
2. The ultraviolet rays will reach the Earth's surface and harm living organisms.

3 **(A)** 1. c 2. d 3. c 4. b

(B) $2CO + O_2 \xrightarrow{\Delta} 2CO_2$

$2(12 + 16) + (2 \times 16) \longrightarrow 2(12 + (2 \times 16))$

88 gm 88 gm

- The sum of reactants masses = 88 gm
- The sum of products masses = 88 gm
- The sum of reactants masses = The sum of products masses which achieves the law of conservation of matter.
- The law of conservation of matter : the sum of reactants masses in any chemical reaction equals the sum of products masses.

(C) - The presence of hydrosphere.
- The presence of the atmospheric envelope containing oxygen gas which is needed for life.
- Its temperature is suitable during both day and night.
- Its atmospheric pressure and its gravitational force are suitable.

4 **(A)** 1. To increase friction between tyres and the road to help car in starting and stopping motion.
2. Because Earth's gravitational acceleration changes from one place to another.

3. Because ionic bond arises between two different atoms (metal and nonmetal) as a result of the electric attraction between a positive ion of an atom of a metallic element and a negative ion of an atom of a nonmetallic element.
4. Because if it contains impurities, it is coloured and if it is pure, it is white.

(B) 1. H_2O 2. Sound waves. 3. Halley.

(C) 1. The distance in light year

$= \frac{\text{Distance in kilometre}}{9.467 \times 10^{12}}$

$= \frac{28.401 \times 10^{12}}{9.467 \times 10^{12}} = 3$ light years.

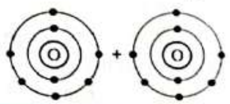
2. a. Monovalent. b. Metal oxide.

El-Menofia Governorate

16 Shebin El-Kom Educational Zone

1 **(A)** 1. H_2O – NaCl
2. mechanical – electromagnetic
3. light year – stars. 4. weight – mass
5. NH_4Cl 6. 2MgO

(B)



2 **(A)** 1. Acids. 2. Periodic motion.
3. Moons. 4. Noble gas.
5. Metamorphic rocks.

(B) 1. $Ca(NO_3)_2$ 2. $CuSO_4$

(C) 1. - It prevents feet from slipping on roads during walking.
- It helps in stopping and starting cars motion.
- It helps in burning match.

2. It protects living organisms from the harmful ultraviolet rays.

3 **(A)** 1. c 2. a 3. b

(B) 1. To achieve the law of conservation of matter.

2. Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.
3. Because they have heat effect property.
4. Due to the presence of the atmosphere that appears as a white colour around the Earth.
5. Due to evolving of carbon dioxide gas.

4 **(A)** 1. (✓) 2. (✗) 3. (✗) 4. (✗) 5. (✓) 6. (✗) 7. (✓) 8. (✓)

(B) 1. Electromagnet. 2. Sulphur oxides.
3. Halley's comet.

El-Gharbia Governorate

17 Samanoud Educational Zone

1 **(A)** 1. carbon dioxide 2. increasing
3. Earth's crust 4. Noble gases – zero.
5. galaxies.

(B) 1. They are used in medical purposes as treatment and discovering of some swellings.
2. They are used to sterilize the sets of surgical operations rooms.

(C) 1. $Mg_3(PO_4)_2$ – Salt. 2. $Fe(OH)_3$ – Base.
3. HCl – Acid.

2 **(A)** 1. Comets.
2. Chemical reaction.
3. Periodic motion.
4. Centre of gravity.

(B) 1. The mass of the bird remains fixed, while the weight of the bird decreases.
2. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
3. White clouds of ammonium chloride are formed.

[$NH_3 + HCl \xrightarrow{\text{conc.}} NH_4Cl$ [white clouds]]

4. Volcanic igneous rocks are formed.

(C) 1. Table salt molecule – Covalent molecules.
2. Saturn – Inner planets.

3 **(A)** 1. b 2. c 3. d 4. a 5. b

(B) 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
2. Because it reduces the effect of oxygen gas during burning processes and plants use it to form proteins.
3. Because sodium chloride is water soluble salt, while silver chloride is water insoluble salt.

(C) 1. *Look at the main book on page (135).*
2. *Look at the main book on page (182).*

4 **(A)** 1. equal to 2. hydrosphere.
3. relative motion.

(B) 1. This means that the distance between the two stars = $2 \times 9.467 \times 10^{12}$
$= 18.934 \times 10^{12}$ km.
2. This means that the ability of the Earth to attract this object equals 30 newton.

(C) 1. $NaOH + HNO_3 \longrightarrow NaNO_3 + H_2O$

2. $NaOH + HNO_3 \longrightarrow NaNO_3 + H_2O$

$(23 + 16 + 1) + [1 + 14 + (16 \times 3)] \longrightarrow [23 + 14 + (16 \times 3)] + (2 \times 1 + 16)$

103 gm ⟶ 103 gm

The sum of reactants masses = 103 gm.
The sum of products masses = 103 gm.
- The sum of reactants masses equals the sum of products masses which achieves the law of conservation of matter.

Dakahlia Governorate

18 Belkas Educational Zone

1 **(A)** 1. Object's weight. 2. Mechanical waves.
3. Galaxies. 4. Moons.
5. Triple covalent bond.
6. Bases.

(B) Object's mass $= \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$

$= \frac{285}{10} = 28.5$ kg.

(C) (1) H_2SO_4 (2) 7 (3) 3
(4) Copper carbonate (5) 5 (6) 3

2 **(A)** 1. white 2. inner core
3. vibrating 4. electricity.
5. X-rays 6. ionic

(B) 1. Because during chemical reactions, sodium atom loses one electron, while oxygen gains or shares with two electrons to complete their outermost shells.

2. To increase friction between tyres and the road to help car in starting and stopping motion.

3. Because the sunlight is an electromagnetic wave which can travel through free space, while the sound of solar explosions is a mechanical wave which can't travel through free space.

4. Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.

(C) $2H_2 + O_2 \longrightarrow 2H_2O$

$2(2 \times 1) + (2 \times 16) \quad 2(2 \times 1 + 16)$

36 gm 36 gm

The sum of reactants masses = 36 gm.
The sum of products masses = 36 gm.

3 **(A)** 1. c 2. c 3. c 4. a 5. b 6. a

(B) 1. $C + O_2 \xrightarrow{\Delta} CO_2$

2. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$

(C) (1) Na_2SO_4 (2) Potassium hydroxide
(3) Nitric acid (4) Sulphur trioxide
(5) Base. (6) Salt.
(7) Acid. (8) Oxide.

4 **(A)** 1. double covalent – single covalent
2. head – tail.
3. The mass of each object – the distance between them.
4. electricity.

5. rushed forward – fall 6. Periodic
7. limestone – sedimentary

(B) *Look at the main book on page (158).*

(C) It is an atom of a nonmetallic element that gains one electron or more during the chemical reaction.

Ismailia Governorate

19 El-Salam Evangelical Language School

1 **(A)** 1. electric – mechanical
2. X-rays 3. 2MgO
4. air 5. Nuclear energy
6. large – small

(B) $C + O_2 \longrightarrow CO_2$

$12 + (2 \times 16) \quad 12 + (2 \times 16)$

44 gm 44 gm

The sum of reactants masses = 44 gm
The sum of products masses = 44 gm.

(C) 1. $^{27}_{13}Al$))) K L M: 2 8 3 - Trivalent.

2. $^{20}_{10}Ne$)) K L: 2 8 - Zero.

3. $^{24}_{12}Mg$))) K L M: 2 8 2 - Divalent.

2 **(A)** 1. d 2. c 3. a 4. b

(B) 1. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

2. Due to :
- The presence of hydrosphere.
- The presence of the atmospheric envelope containing oxygen gas which is needed for life.
- Its temperature is suitable during both day and night.
- Its atmospheric pressure and its gravitational force are suitable.

3. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

(C) *Look at the main book on page (158).*

3 **(A)** 1. Nitrogen 2. two 3. Weight
4. Comets 5. carbon (graphite).

(B) Object's weight = Object's mass × Earth's gravitational acceleration
= 28 × 10 = 280 newton.

(C) 1. Sound waves. 2. Light waves.
3. A person's motion. 4. Chloride ion.
5. Movement of the Moon around the Earth.

4 **(A)** 1. Sulphur oxides. 2. Moons.
3. Friction forces. 4. Atomic group.
5. Marble.

(B) 1. 150 million kilometres.
2. 76 cm.Hg.
3. 9.467×10^{12} km.
4. Four atoms.

(C) ① Earth's crust "8 – 60 km approximately."
② Mantle "2885 km approximately."
③ Inner core "1350 km approximately."

Damietta Governorate

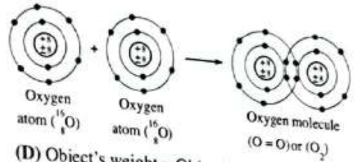
20 Official Language Schools

1 **(A)** 1. mechanical – electric
2. hydrogen – hydroxide
3. mechanical – electromagnetic
4. the mass of each object – the distance between them.
5. carbon dioxide – nitrogen
6. calcium carbonate

(B) 1. Calcium oxide "Oxide"
2. Potassium hydroxide "Base"
3. Sodium sulphate "Salt"
4. Nitric acid "Acid"

(C) 1. $^{16}_{8}O$)) K L: 2 6

2.



(D) Object's weight = Object's mass × Earth's gravitational acceleration
$= 0.3 \times 9.8 = 2.94$ newton.

2 **(A)** 1. Mantle. 2. Inertia.
3. Chemical reaction. 4. Comets.
5. Ionic bond. 6. Valency.

(B)

1. Infrared rays :	They are used in : - night vision systems used by modern military forces. - remote sensing instrument to photographing the Earth's surface using satellites. - cooking food. - making remote sets.
2. Ultraviolet rays :	They are used to sterilize the sets of surgical operations rooms.
3. X-rays :	They are used in : - photographing bones to detect the sites of bone fractures. - examining mineral raws in industry and showing errors, pores and cracks in these minerals.
4. Gamma rays :	They are used in medical purposes as the treatment and discovering of some swellings.

(C) 1. – **Meteors :** Consist of small rocky masses.
– **Meteorites :** Consist of large rocky masses.

2. *Look at the main book on page (134).*
3. *Look at the main book on page (182).*
4. – **Weak nuclear force :**
It is used to get radioactive elements and radiations which are used in :
- Medicine.
- Scientific researches.
- Industry.

- **Strong nuclear force :**
  It is used in :
  - Producing electricity.
  - Military purposes.

3 (A) 1. Due to the completeness of their outermost energy levels with electrons.
2. To achieve the law of conservation of matter (mass).
3. Because oxygen atom shares each of the two hydrogen atoms with one electron.
4. Because they consist mainly of gaseous bodies.

(B) 1. It helps in stopping and starting cars motion.
2. They are used for identifying the celestial bodies.
3. It is used in making of electric bells.
4. It is used in photographic cameras.

(C) 1. Nonmetal. 2. Monovalent.
3. Negative ion. 4. Ionic bond.

(D) $C + O_2 \xrightarrow{\Delta} CO_2$

$12 + (2 \times 16) \qquad 12 + (2 \times 16)$

44 gm. 44 gm.

The sum of reactants mass = 44 gm.
The sum of products mass = 44 gm.

4 (A) 1. b 2. c 3. a 4. b 5. c 6. d

(B) 1. The colour of litmus paper changes into blue.
2. White clouds of ammonium chloride are formed.
$NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
3. The ultraviolet rays will reach the Earth's surface and harm living organisms.
4. A white powder of magnesium oxide is formed.
$2Mg + O_2 \xrightarrow{\Delta} 2MgO$

Port Said Governorate

21 Science Inspectorate

1 (A) 1. Mercury – bromine
2. electric winches – electric bells.
3. Reflecting telescope – refracting telescope
4. vibrating – circular
5. Carbon dioxide

(B) 1. Because the number of electrons becomes less than the number of protons.
2. Because it protects living organisms from the harmful ultraviolet radiations.
3. Because the upper part is fragmented and loosened but the lower part is solid.

(C) 1. $Ca(OH)_2$ 2. $CuCO_3$

2 (A) 1. Noble gases. 2. Friction force.
3. Comets.
4. Electromagnetic waves. 5. Nitrogen.

(B) 1. **Carbon oxides :**
– Carbon monoxide. – Carbon dioxide.
Sulphur oxides :
– Sulphur dioxide. – Sulphur trioxide.
2. ***Look at the main book on page (106).***
3. **Meteors :** They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
Meteorites : They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.

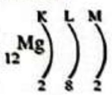
(C) $C + O_2 \xrightarrow{\Delta} CO_2$

$12 + (2 \times 16) \qquad 12 + (2 \times 16)$

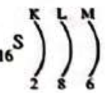
44 gm. 44 gm.

The sum of reactants masses = 44 gm.
The sum of products masses = 44 gm.

3 (A) 1. inner 2. NaCl
3. Weight 4. light year.
5. Nitrogen oxides 6. third
7. 97%

(B) $_{12}Mg$ 

- Metal.

$_{16}S$ 

- Nonmetal.

(C) Object's weight
= Object's mass × Earth's gravitational acceleration.
= 0.3 × 9.8 = 2.94 newton.

4 (A) 1. c 2. d 3. b

(B) 1. It is a chemical bond resulted from the electric attraction between a positive ion and a negative ion.
2. It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
3. It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.
4. They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.

(C) 1. (1) Earth's crust. (2) Mantle.
(3) Outer core. (4) Inner core.
2. Iron and nickel.

El-Behira Governorate

22 Ismail El-Habrouk Language School

1 (A) 1. b 2. b 3. c 4. b 5. c

(B) 1. Because sound is a mechanical wave which can't travel through free space.
2. To achieve the law of conservation of matter.
3. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

(C) $2CO + O_2 \xrightarrow{\Delta} 2CO_2$

$2(12 + 16) + (2 \times 16) \longrightarrow 2(12 + 16 \times 2)$

88 gm. 88 gm.

The sum of reactants masses = 88 gm.
The sum of products masses = 88 gm.

2 (A) 1. $_{16}S$ – Noble gases.
2. Sound waves – Electromagnetic waves.
3. Respiratory system malfunction – The negative effects of carbon monoxide.

(B) 1. They are used to sterilize the sets of surgical operations rooms.
2. It is used in making of electric winches and electric bells.
3. They are used for identifying the celestial bodies.

(C) ***Look at the main book on page (120).***

3 (A) 1. sodium chloride – silver chloride
2. the mass of each one – the distance between them.
3. 76 cm.Hg.
4. cars motion – burning match.
5. plutonic rocks – volcanic rocks.

(B) 1. White clouds of ammonium chloride are formed. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
2. The ultraviolet rays will reach the Earth's surface and harm living organisms.
3. Volcanic igneous rocks are formed.

(C) 1. - Object's weight = Object's mass × gravitational acceleration on Earth's surface = 500 × 9.8 = 4900 newton.
- Object's weight = Object's mass × Gravitational acceleration on Mars's surface = 500 × 3.72 = 1860 newton.
2. The mass of spaceship on Mars's surface is 500 kg, because the mass of the object doesn't change from a planet to another.

4 (A) 1. Chemical reaction. 2. Atomic group.
3. Light year. 4. Periodic motion.

(B) 1. a. 17 b. 3
2. a. nonmetal. b. monovalent.
3. a. ferric oxide. b. metal oxide.

(C) 1. – **Meteors :** They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
– **Meteorites :** They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.

2. – **Ionic bond :** Sodium chloride and magnesium oxide molecules.
 – **Covalent bond :** Hydrogen and water molecules.

Fayoum Governorate

23 Science Supervision

1 (A) 1. HCl – NaOH
2. electric winches – electric bells.
3. Mercury – Jupiter
4. ionic bond – double covalent bond.

(B) 1. It is the breaking of the existing bonds between the atoms of the molecules in the reactants and forming new bonds between the atoms of the molecules in the products
2. They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.
3. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

(C) 1. They are used to sterilize the sets of surgical operations rooms.
2. Examining and curing equipments for the human body.
3. It is used in producing electricity.

2 (A) 1. friction force. 2. Bases
3. 71% 4. nickel.
5. Weight 6. electric

(B) 1. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$
Combination of an element with a compound.
2. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$
Combination of a compound with another compound.

(C) 1. ***Look at the main book on page (135).***
2. ***Look at the main book on page (158).***

(D) Object's weight
= Object's mass × Earth's gravitational acceleration
$= 10 \times 9.8 = 98$ newton.

3 (A) 1. Light year. 2. Positive ion.
3. Meteorites. 4. Noble gases.
5. Force.

(B) 1. d 2. c 3. c 4. b 5. a 6. c

(C) 1. A white powder of magnesium oxide is formed. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
2. The ultraviolet rays will reach the Earth's surface and harm living organisms.

4 (A) 1. Because acids when dissolved in water produce positive hydrogen ions which responsible for their properties.
2. Because it causes air pollution and lung cancer.
3. Due to the difference in the gravity acceleration from a planet to another.
4. Because sandstone is yellow in colour and its texture is coarse, while limestone is white in colour and its texture is smooth.

(B) 1. ⓐ Earth's crust. ⓑ Mantle.
ⓒ Outer core. ⓓ Inner core.
2. Layer ⓒ (Outer core).

(C) $_{17}Cl$ (K 2, L 8, M 7)
1. Nonmetal.
2. Negative ion.
3. Monovalent.

$_{10}Ne$ (K 2, L 8)
1. Noble gas.
2. No ion.
3. Zero.

Beni Suef Governorate

24 Official Language School

1 (A) 1. Sun – Earth
2. mercury – bromine.
3. mechanical – electromagnetic
4. iron – nickel.
5. quartz – mica – feldspar – olivine – pyroxene – feldspar

(B) 1. They are used in :
- night vision systems used by modern military forces.
- remote sensing instrument to photographing the Earth's surface using satellites.
- cooking food.
- making remote sets.

2. It is used in making of :
- electric winches. - electric bells.

3. It makes the life possible through :
- Constancy and steadfastness of objects and living organisms on the Earth's surface.
- Steadfastness of the hydrosphere position on the Earth's surface.
- Keeping the Earth surrounded by the atmosphere.

(C) 1. $_{20}X$ (K 2, L 8, M 8, N 2)
2. positive ion.
3. Ionic bond.
4. They can't react together, because $_{18}Ar$ is from noble gases which its outermost energy level is completed with electrons.

2 (A) 1. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$
2. $2Mg + O_2 \xrightarrow{\Delta} 2MgO$

(B) 1. Ball's weight
= Ball's mass × Earth's gravitational acceleration
$= 0.3 \times 9.8 = 2.94$ newton.
2. Boy's weight
= Boy's mass × Earth's gravitational acceleration
$= 50 \times 9.8 = 490$ newton.

(C) 1. Transitional motion. 2. Comets.
3. Oxygen. 4. Oxides.
5. Neptune.

3 (A) 1. – **Sodium sulphide :** Salt soluble in water.
 – **Lead sulphate :** Salt insoluble in water.
2. ***Look at the main book on page (158).***
3. ***Look at the main book on page (182).***
4. ***Look at the main book on page (107).***

(B) 1. Because the number of electrons becomes more than the number of protons.
2. Because sound is a mechanical wave which can't travel through free space.
3. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

4. To increase friction between tyres and the road to help car in starting and stopping motion.
5. To achieve the law of conservation of matter (mass).

(C) 1. $Ca(NO_3)_2$ 2. $CuSO_4$ 3. Na_2CO_3
4. Al_2O_3 5. NH_4NO_3

4 (A) 1. a 2. a 3. b 4. b 5. a 6. b

(B) 1. Planets of solar system.
2. The mass of the Earth.
3. Light year.
4. The normal atmospheric pressure.
5. The ratio of carbon dioxide gas in the atmospheric air.
6. The ratio of water bodies concerning the area of Earth's surface.

(C) $C + O_2 \xrightarrow{\Delta} CO_2$
$12 + (2 \times 16)$ → $12 + (2 \times 16)$
44 gm. → 44 gm.
The sum of reactants masses = 44 gm.
The sum of products masses = 44 gm.

Sohag Governorate

25 Sohag Educational Zone

1 (A) 1. ionic – triple covalent
2. mechanical – electromagnetic
3. iron – nickel.

(B) Object's mass
$= \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}} = \frac{98}{9.8}$
= 10 kg.

(C) 1. $2CO + O_2 \xrightarrow{\Delta} 2CO_2$
2. $NH_3 + HCl \xrightarrow{conc.} NH_4Cl$

2 (A) 1. Valency. 2. Friction force.
3. Infrared rays. 4. Chemical reaction.
5. Periodic motion.

(B) 1. It protects living organisms from the harmful ultraviolet rays.

2. They are used to sterilize the sets of surgical operations rooms.

3. Plants use it to form proteins.

(C) 1. Weight 2. Salty

3. Nitrogen oxides

3 (A) 1. b 2. a 3. c 4. b 5. b 6. a

(B) $2Mg + O_2 \xrightarrow{\Delta} 2MgO$

$(2 \times 24) + (2 \times 16) \longrightarrow 2(24 + 16)$

80 gm. 80 gm.

The sum of reactants masses = 80 gm.

The sum of products masses = 80 gm.

(C) 1. H_2SO_4 2. $Ca(NO_3)_2$ 3. Al_2O_3

4 (A) 1. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

2. Because Earth's gravitational acceleration changes from one place to another.

3. Due to the gravitational force of the Earth.

4. Because during chemical reactions, potassium atom loses one electron, while oxygen gains or shares with two electrons to complete their outermost shells.

(B) 1. (✗) .... the Earth's crust.

2. (✗) Earth's radius at the equator is larger than that between the two poles.

3. (✗) Bases ....

4. (✗) .... 76 cm.Hg.

5. (✓)

6. (✗) .... vibrating motion.